Australian Model Engineering

March-April 1997

Issue 71

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- ☑ A 5"g NSWGR Z13 Locomotive
- ☑ Building an Astronomical Telescope

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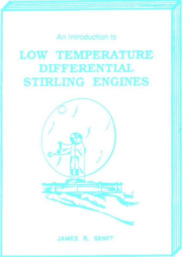

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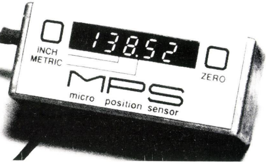

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March-April 1997 Issue 71

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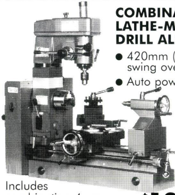
The Cover

No 11 and No 9 basking in the Western Australian sun as they wait their next call for duty at the Castledare Miniature Railway. Both of these locos form part of the evolutionary chain to "Sweet Creek" — the story starts on page 9...

Photo: Keith Watson

HAFCO Workshop Equipment



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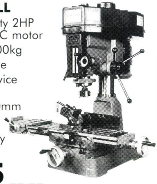

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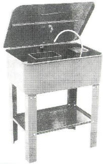

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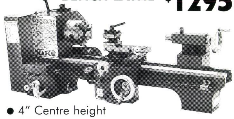

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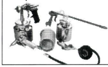

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Managing Editor
Brian Carter ....(02) 9649-5301
Bus. Hrs: 018 022209
Fax (24 hrs): (02) 9646-1362
email: b.carter@edfac.usyd.edu.au
Contributing Editors
Leigh Adams, Neil Graham, Dave Harper, Clive Huggan, David Proctor
Asstistant Editing
Tony di Salvo, Murdoch Finlay, Alan Holswich, Trevor Jones, John Oliver, Kris Siderov, Paul Trevaskis
Draughters
Dave Adams, Ian Flower, Ken Gifford, Rod Heslehurst, Peter Kerville, Peter Manning, Zenon Zalewski
Assistant Typesetting
Tom Hulse
Keyboards
Susanne Carter, Phyl Oliver, Trish Thompson
Contributors
Lindsay Brack, Terry Collins, Stuart Daniels, Peter Dawes, A.W. Easton, Bill Fowler, David Gregory, John Hall, Bob Henderson, Bob Kimber, Peter Lukey, Neil Matherson, Ted Murrell, Peter Olds, Bill Parker, Scott Robertson, Alex Russell, Doug Shaw, Rod Sullivan, James Tennant, Keith Watson, Colin Wear, Allan Wright.
Subscriptions
Paul Graham ....(048) 84-4324
Back Issues
Robert Fox ..... Ph/Fax (042) 56-5013
AME Retail
Les Mouat
Publication Manager
Neil Graham.................(048) 84-4324
email: graham@nspace.com.au
Area Representatives
Western Australia
Doug Baker..................(09) 341-1630
South Australia
John Wakefield..........(08) 8362 3269
Victoria
Bill Belton ....(054) 28-7015
Bill Taylor ....(03) 9458-3404
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Don Bateson ....(03) 6435-7524
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Gerardus Mol ....(06) 258-1797
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Comment

What I get out of Model Engineering

As a child I spent countless hours at the Melbourne Museum, fogging up the glass cases of model ships, clocks and other goodies. I grew up amidst cabinetmaker's shavings, veneers and wood glue — I spent my childhood making model ships and aircraft from wood. However, my formal technical education was fitting and turning, with mechanical engineering. I served my apprenticeship at BHP Steelworks, Newcastle. An excellent apprenticeship it was too, for I feel I have retained virtually all of it.

My career branched into drafting and later town planning, but I found I still had the urge to make things in metal. I reckon I had steam in my veins after working on the stationary two-cylinder steam engine on the ancient No. 1 blast furnace at the BHP plant. I used to watch the old narrow gauge 0-4-0 Porter locos at BHP, resplendent in royal blue, black and gold livery. They tirelessly shunted billets of iron and steel around the plant and I grew in admiration of these tiny but big-hearted locos.

More recently I happened to find a copy of AME in a newsagent and started reading about models, especially locos. I was fascinated to see such life-like replicas and quickly had the urge to do the same. I went to the AALS Convention at Illawarra and the wonderful locos there blew my mind. That was it! I returned home and started a Blowfly but have longer term plans to build a NSW 59 Class. It won't stop there either.

I get very absorbed in making little bits and pieces for something much larger. That is my "time out" from all the stresses of modern living. This work keeps the skills of older times alive, many of which are disappearing! It brings it all back — these are skills that actually produce something, skills that you can share for others to appreciate.

Surely every model engineering project ever built, must have somehow incited someone else to build something, or perhaps get a forgotten project out and start again. At the model loco rallies I have been to, it thrilled me to see the older members proudly showing off their models (or someone else's) to eager youngsters. This is an important part of the process, for some of them will surely take up the hobby. That is why we should always do the best in our modelling — to set an example and inspire.

I have always been a do-it-yourself freak. I love the planning stage with all its anticipation. I enjoy seeing the bits and pieces take shape. I Find the fine work of fitting pieces together most rewarding. However, the real enjoyment comes from using my skills and learning many new ones, in producing something you can see, touch, hear and smell!

It is exciting to turn something out and see a model taking shape. I love lathework, but still get a lot out of handwork. Fortunately, models require much of this, particularly when you have only minimal equipment. I even get a kick out of getting raw materials and anticipating the results. I'm often up at 5 am making bits and pieces, or just pondering on the next stage, nutting out how to do it. The best thing is, you are your own boss. If you mess it up, you have no one to blame but yourself.

Somehow to me, the building part of the project is the most important. But then — I haven't yet got past that stage. The joy of running the finished model is still to come!

Peter Kerville

To our new reader

If this is your first issue of Australian Model Engineering, welcome! We hope you'll look forward to the ideas, news and camaraderie in each bi-monthly issue.

One of the great things about our hobby is the way model engineers actively help each other. Unless you live in an isolated community, you'll soon discover who has valuable experience in your field of interest, or who will help you to make a part that's too big for your workshop machinery. Look in the *Club Roundup* section to find a club that's near to you; pay a visit and you'll usually find model engineers who live not too far away. Then you can experience the great fellowship that makes our hobby special.

This magazine is prepared in the same spirit of "model engineers helping each other". About two dozen people put many hundreds of hours work into each issue — all on a voluntary basis — to help model engineers in Australia and New Zealand keep up to date and stay in touch.

We rely on our readers to write articles for us — for the same (non-existent) rate of pay! If you have ideas or techniques that you feel would be interesting to others, please drop us a line. We'll gladly help with preparation of artwork or editing if that's necessary. Most important of all, please support the people who advertise in our magazine. Without them to pay the bills, you wouldn't be reading this!

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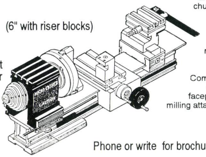

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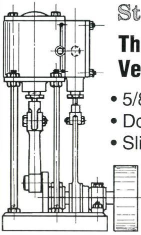

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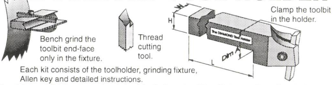
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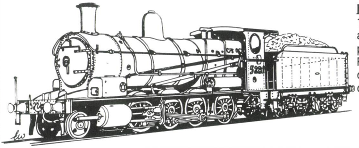

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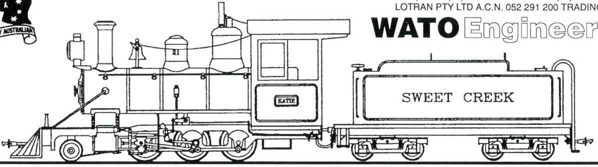

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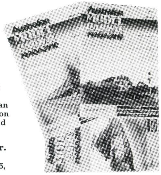

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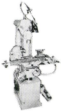

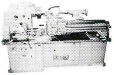

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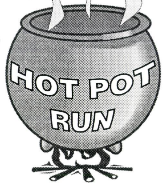

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* * * * * *	Frame Component Flame-cutting Templates
422B-001(E)	GM Cast Bogie Assembly / Aranement
422B-002	GM Cast Bogie Machining Details & Sundry parts (Sheet 1)
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The Development of *Sweet Creek*

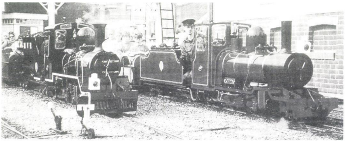
The Formula 9 Locomotive

by Keith Watson

Sweet Creek is not a large 7¼" (184mm) gauge loco today, especially when compared with the latest locomotives of the same gauge being built and operated in United Kingdom.

Recently I returned from a railway holiday in England and confess I was most impressed by the locomotives being built by Jim Haylock and his brother for their Moors Valley Railway in Dorset. This is a serious railway with gradients that require heavy locomotives.

Two of their engines, *Offa* and *Zeus* are 2-6-2 tender engine configuration and cylinders of 117.6mm bore, and 107.95mm stroke, with boilers which are 406.4mm diameter and a capacity in excess of 100 litres — and we thought we did things big in Australia!

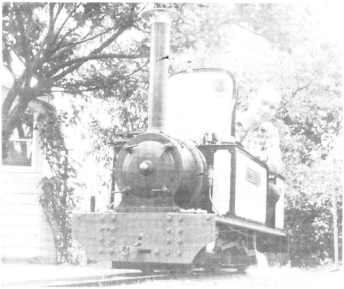


***Offa** and **Zeus** on the Moors Valley Railway.*

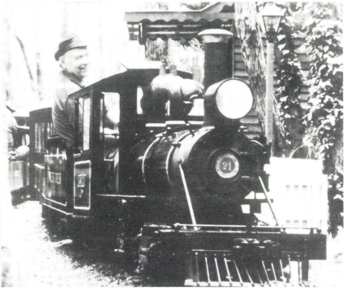
These engines are to scale, based on South African two foot gauge locos where the boilers are around 1372mm diameter. There are two of these full-size locos in Perth running on the Bennet Brook Railway. If anyone wants to see just how big a two foot gauge loco can be, come to Perth and see for yourself.

The beginning

The *Sweet Creek* story really began back in 1969 when I met Roger Marsh (now chief engineer of the Romney, Hythe And Dymchurch 15" gauge railway). Roger had just completed his *Tinkerbell,* a 7¼" 0-4-2, which originally started out to be a model of the 18" gauge Beyer Peacock, 0-4-0 WT used at the old Horwich loco works to transport heavy components around the works. Baldwin in the US had a similar set-up using a tiny saddle tank loco.



*A younger Keith Watson rides **Tinkerbell** for the first time in 1969.*



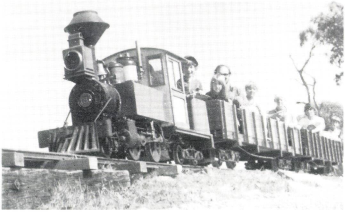
***Sweet Creek** with the author at the throttle.*

Roger had decided to extend the frame rearward on this tiny loco, to allow a full-size driver to be accommodated on the footplate. I believe this started the trend of riding the footplate in 7¼" gauge. The engine was, at this point, following along the lines of Heywood engine building — or true minimum gauge railways. *Tinkerbell* has Heywood valve gear and the typical Heywood style weatherboard.

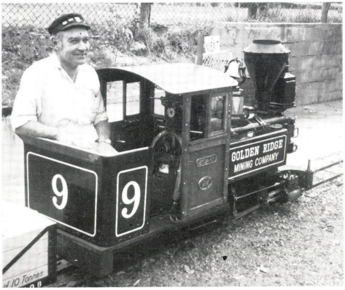
I was very impressed, and on return to Australia I built my version of *Tinkerbell*, except I wanted to be able to negotiate very sharp curves of 6 metre radius, I also wanted to get more traction. This was achieved with use of the Klein-Lindner-Watson rear axle which allowed me to build the loco as an 0-6-0 and have the added weight of the driver act on the rear axle to obtain a greater factor of adhesion.

The rear wheel-set can move to an offset of 44.5mm to each side of the normal centerline, the loco easily goes around a 6 metre curve. The loco has a 273mm diameter Briggs boiler with 76.2mm bore and 101.6mm stroke cylinders. It makes enough steam to haul 176 passengers around the Castledare Miniature Railway, and 25 years later it is still working! I named the engine *Denis P Moore* after a very good friend who helped at the outset of Castledare.

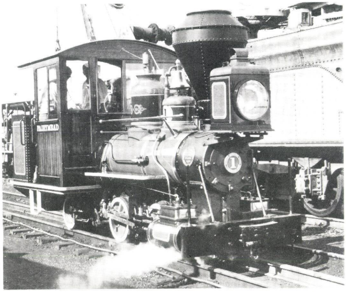
The late Harry Dixon who was a very early member of the Brotherhood of Live Steamers in the US said "Keith, you must build an Ameri-



*The 12" gauge **Colorado** before signwriting.*



The original ***Stuart No 9****.*



A No.9 infuence — the 2ft gauge Baldwin 0-4-2 ***Fairymead****. Graeme Belbin is Driving with Bruce Macdonald also on board.*
Photo: Gaye Cozens

can locomotive, how about a narrow gauge loco of your type?" *Denis P Moore* was the inspiration to go on to my next loco *Colorado*.

It was at this time that I came across a large quality of light 6.4kg rail going out at scrap price — an offer too good to be true. I could use it to build a 12" gauge railway.

The design of *Colorado* was to be a convertible gauge loco to be built as a 12" gauge loco but, designed to have the wheels moved inside the frames to become a 7¼" loco if desired. The wheel arrangement was 2-4-4, a modified Forney.

This loco was built with 95.25mm x 114.3mm cylinders and a 304.8mm diameter Briggs boiler. *Colorado* ran for about four years at *Clontarf*, a boys home near Perth. Sadly I had to sell the railway as a complete lot when I was called to work in the oil industry back in England.

While in England, working for the Plenty Group, which specializes in the oil pump and filter business, I constructed a 9½" narrow gauge loco for a line in Berkshire, this used the same size cylinders and boiler as *Colorado*.

On return to Australia I purchased *Colorado* back and later sold it to John Bone of Victoria who promptly converted it to 7¼" gauge, and after a season or two of operation, sold it to a fellow in Brazil.

No 9 evolves

After this I decided I wanted a 7¼" gauge loco of a decent size to run at the expanding Castledare Miniature Railway as the *Heidi* class was just not big enough to cope with the increasing loads. So on to the drawing board again and *Stuart No.9* was conceived.

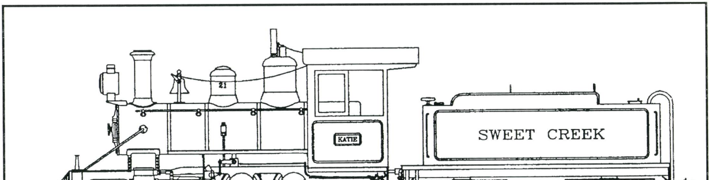
Two prototypes had an influence on No.9: The first being the Baldwin that worked on the Fairymead sugar mill in central Queensland, and more recently as faithfully restored to working order by Bruce Belbin of Sydney. The second prototype was a narrow gauge Baldwin 0-4-2 which worked on the Pacific sugar mill plantation on Hamakua, Hawaii.

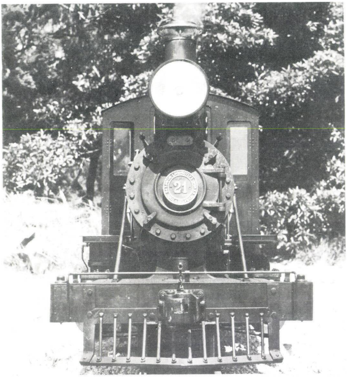
These locos seemed to have the correct proportions to do the minimum gauge Heywood conversion to allow me to ride the foot plate. The basis of design was the standard formula — 76.2mm x 101.6mm cylinders 273mm diameter Briggs boiler 241.3mm diameter driving wheels — the loco took shape in the Wato workshop. The loco was finished and run at Castledare and declared a success. Stuart No.9 was born again — I was confident that the design could be enlarged.

Sweet Creek

I had a phone call from Dr Ken Tate of Melbourne who asked me if I could build a 7¼" narrow gauge Baldwin Mogul along the lines of my Stuart No.9. I agreed, and after much discussion we settled on a design which became the first *Sweet Creek* — again the standard formula was used. I built the chassis and Ken was to finish it off by adding a Briggs boiler and a lovely bogie tender which gives the driver plenty of space. The loco had Walschaerts valve gear and leaf springs — it looked great.

At the same time I built another No.9, this time it was called *Bronny* after George Hadley's daughter Bronwyn. My workshop seemed to be full of No.9 locomotives — I was in real production mode. However, *Sweet Creek* was shipped out and completed in Ken's workshop. On trial on the Diamond Valley track at Eltham Park Victoria, *Sweet Creek* acquitted itself in fine style by hauling some sixteen loaded wagons around the heavily graded track. Since then there have been

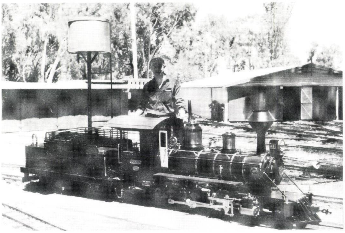




Sweet Creek

several No.9 clones built. Ian Willis completed several for customers in Australia and overseas adding his own variations.

One of the finest *Sweet Creeks* ever built has to be *Dixie*. It was built by Stan Andrews, with help from Ian Willis, Phil Gibbons, and Hubert Hagen. The loco took quite a few years to build, but it is delightful to see it in operation. The modest 254mm diameter Briggs boiler, despite the skeptics, makes adequate steam for the 76.2mm x 101.6mm cylinders. The driver has a loco quite powerful to do all that is required of this medium weight Mogul.



***Dixie** — one of the finest **Sweet Creek** class built.*

What of the future — and bigger gauges?

7¼" gauge is a good gauge to build in, yet when it comes hauling heavy loads on a regular daily basis the track is easier to maintain if light steel rail of 5.5 to 6.4kg per metre is used. For example the Diamond Valley railway have used this size rail for many years and it has proven to be much superior to 25mm x 12mm flat steel bar, or the aluminium rail used on many tracks today.

However, I must make a comment here that it is interesting to note that the Moors Valley railway (UK) with the big 7¼" locos use alloy rail, but it is showing signs of severe wear. If you are considering heavy haulage then steel rail is the way to go, as it cuts down the rail and rolling stock wear, is easier to lay and has longer life. Light rail is still available and if you are going to this expense you should consider the next gauge up i.e. 12" or 15" gauge.

Two good examples in Australia are the 12" gauge Smokey Mountain Railway at Warnervale NSW and the Bush Mill Railway near Port Arthur Tasmania. Both of these railways are serious lines and are not cheap to build, the cars carry two people abreast and can be fully enclosed as is now the norm on British railways of the same gauges.

The bigger gauges

Please don't get confused by 15" gauge. When you stop and consider such famous railways as the Romney Hythe and Dymchurch, established as long ago as 1925, and the Ravenglass and Eskdale line set amid the beautiful Cumbrian lakes district, and the Fairbourne Miniature Railway 12¼" gauge. These are heavy-duty lines with big locomotives and are really outside the scope of this article.

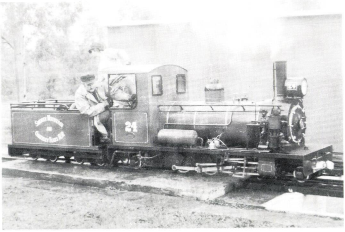
The thoughts I have in mind are for the enthusiast who has a few acres of land and wants to build a 12" or 15" gauge railway for fun with the possibility of perhaps earning a dollar later. A loco for this sort of work should not be a big loco such as a Pacific or even a doubled-up *Sweet Creek*, as the costs of patterns and castings are very high plus machining and of course a big boiler.

As I see it consideration should be given to a lightweight loco to start with to give the builder an idea of what big gauge is all about, yet keep the costs within a reasonable budget. This will allow a large part of the work to be done on the machinery currently available, presuming the builder has a lathe of about 330mm swing capacity.

The late Erich Tomsen of the 15" gauge Redwood Valley Railway in the US had this idea in mind and drew up a delightful little 0-4-0 tender locomotive for the beginner in 15" gauge. This has the same formula as *Sweet Creek*, 76.2mm x 101mm cylinders 273mm diameter boiler and 10" diameter driving wheels. Without doubt this is getting close to what we should think about when we consider 12" to 15" gauge.

Considering the heavier wagons hauled on the bigger gauges, the size should be increased by about 20% i.e. to 95.25mm x 114.3mm cylinders, 304.8mm diameter driving wheels, and a boiler of 304.8mm or 356mm size. These are the same sizes as my *Colorado* mentioned earlier. The resultant loco can either be an 0-4-0, 2-4-0, or a 2-4-4 where the driver rides the footplate. This would be an ideal size for the construction loco, and for initial operation.

If all this goes okay and you still have some interest in a bigger loco then the next size of loco should be with cylinders 127mm x 177.8mm, 381mm drivers and a boiler of 457mm to 508mm diameter by this time the builder will realize that to pull really heavy loads you'll need a bigger loco that costs quite a bit of cash!



12" gauge half-size cane loco on the Smokey Mountain Railway.

Building an Astronomical Telescope

Part 1 — Introduction

by Doug Shaw

Drawings for publication by Dave Adams

What is a series of articles about astronomical telescopes doing in a magazine for model engineers? The answer is that a couple of letters have appeared in letterbox on the subject. Also, engineering skills have been very much to the fore in designing and constructing these instruments and their associated equipment. Such an exposition on this subject should rest comfortably with the psyche of readers interested in working to fine tolerances. In optical work, where accuracy about 1000 times normally engineering tolerances are required and routinely achieved, and also for the mechanical work relating to a good useful telescope system. Our telescope will indeed be a model of the great professional instruments.

When I first offered AME some articles on astronomical telescope construction I must admit to not have given a great deal of thought to the matter. It was only after renewed acquaintance with my dusty library on telescope making, untouched for many years, that I realized the enormity of my proposal. Mature consideration has brought me to the conclusion that little more than an overview of the subject will be possible in a few articles and it will be necessary to deal mainly with principles rather than telescope design. However the object never the less will be to enable the interested amateur to make a powerful telescope capable of revealing many of the wonderful objects to be observed against the strange three dimensional velvet blackness of space, and hopefully acquire a lot of enjoyment of the way.

Neither will the series be an erudite state of the art exposition but only an account drawn from the accumulated experience of one amateur among many who have been successful in making and using these instruments.

Some relevant optics

The amount of light we can observe emanating from any object from which we look at, is limited by the size of the pupils of our eyes. The diameter varies between 3mm and 7mm depending on how much light enters. This isn't much light, hence the need for optical magnifying devices Per Se, to satisfy our normal curiosity about things in general, be it in the detail on a postage stamp or the structure of a spiral nebula. The more light that can be collected and concentrated into the available pupil diameter, the brighter and more detailed the object will appear.

Suppose we now consider a few facts about the nature of light and its manipulation, mostly by courtesy of Sir Isaac Newton. If a ray of light from a point source strikes a flat reflecting surface it will be reflected at the same angle as the incident ray, that is the angle of incidence equals the angle of reflection (Fig.1).

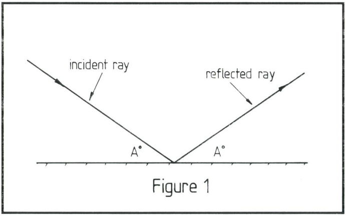


Figure 1

When light passes through the interface between any two translucent media it is bent. The term for this is refraction (Fig.2). The ratio $n = \frac{\sin A}{\sin B}$ gives the measure of the medium's ability to bend incoming light and is called its refractive index. The law of refraction applies to glass (since it is a translucent medium) and its refractive index varies with composition.

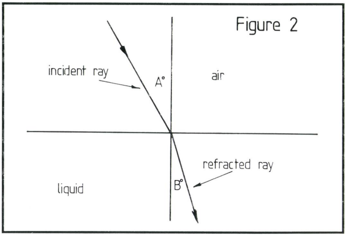
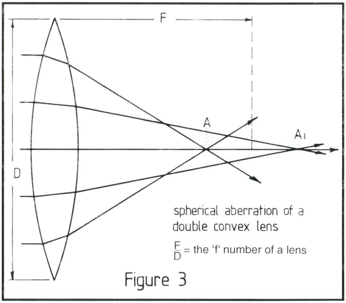


Figure 2

Lenses

Lenses generally have spherical surfaces either concave or convex and a double convex lens is probably the most common device used for concentrating light rays. Who has not used such a lens held to catch the suns rays to set alight paper? If one was sufficiently observant and had a good enough pair of dark glasses one may have realized that the tiny spot of concentrated rays was an actual image of the sun. (*Warning*; Never look directly at the sun. Permanent damage can be done to your eyesight.) Again no doubt everyone is aware of the inverted extended images which such lenses project on to a flat surface from a distant object. The photographic camera, nowadays with lenses of far greater sophistication than that of the simple convex lens, is one such example.



spherical aberration of a double convex lens

$\frac{F}{D}$ = the 'f' number of a lens

Figure 3

We should now briefly explore how distant light behaves when passing through a simple symmetrical double convex lens. The parallel incoming or incident rays of a distant object are bent at the first air/glass interface and again as they exit at the second interface as a result of refraction. The light then converges to the focus of the lens, which lies on the optical axis and forms an inverted image.

It will be seen from Figure 3 that the effect of refraction of the incident light rays on various zones of the lens varies from zero at it's centre to a maximum at it's extremities. No rays really intersect exactly to form a perfect focus. Thus the real focus forms an extended line between A and A1 along the axis, producing an inevitably hazy image. This is known as spherical aberration and can be minimized by reducing the effective diameter of the lens with a suitable annulus of opaque material (an aperture stop), or by using a lens design where the radius of curvature is large compared with its diameter. This results in a high f-number, for example one between $\frac{f}{12}$ and $\frac{f}{15}$ the f-number is simply the ratio of focal length over lens diameter. Such focal ratios are suitable for general viewing but not for most celestial photography. A similar situation exists in the simple box camera with its high f-number and we all know that they are not much in favour with photographers!

Another deficiency of the simple convex or concave lens is chromatic aberration. The refractive index of a translucent medium also depends on the colour of the light passing through it. White light as Newton showed is not really white at all, but merely the neutral result of "all the colours of the rainbow". Each colour has a different wave length, the extremes of this visible spectrum being red and blue light.

The various colours converge at different angles and manifest themselves as colour fringes around the image of the object being viewed, thus revealing again that a simple lens is a very undesirable one for present purposes. However we cannot do without such a device. Fortunately the common convex lens if made of crown glass and combined with a concave lens of similar diameter but made from flint glass produces a lens without chromatic aberration by "playing off" the refractive index of one against the other. The result is a single lens of two components known as an achromatic doublet. This lens forms the essential component for all that class of telescopes known as refractors. A refracting telescope requires for its primary objective a lens having four surfaces of rather expensive glass with precise refractive indices. The achromatic doublet finds a further use, often greatly modified in oculars or eyepieces.

Mirrors

So far we have only considered one means of constructing a telescope by using a lens for the primary objective. There is however another general class of telescope known as the reflecting telescope. Instead of a lens the light gathering device is a concave mirror. Thus the four expensive surfaces required for a achromatic doublet can be replaced by a single surface greatly reducing the work involved and also the cost.

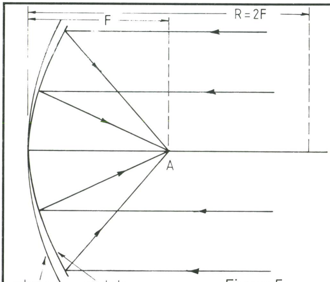


Figure 5

In 1668 Sir Isaac Newton constructed the first reflecting telescope which had a tiny highly polished concave metal mirror. Nowadays glass has replaced metal. Strictly speaking this statement is untrue because the modern glass mirror is merely the support for a highly reflecting, microscopically thin film of silver or aluminium.

If we can consider instead of the spherical convex lens, a spherical concave mirror, we find it too suffers from spherical aberration although an important gain is made. Since light is reflected and not refracted chromatic aberration is eliminated (Fig.4). If we now replace the spherical form of the concave mirror with that having a parabolic curve we can also eliminate spherical aberration.

In this form of curve all parallel reflected rays can be brought to a precise focus. A parabolic mirror of the same diameter as a spherical mirror is slightly deeper particularly toward the inner zone of the mirror. The difference in practical terms between the spherical and parabolic curves is extremely small being measured in microns for small mirrors. Forming the parabolic curve from the spherical, though the last step in mirror making is also the most taxing (Fig.5).

to be continued...

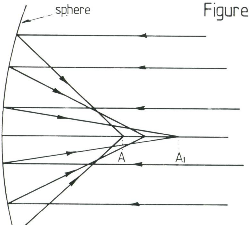


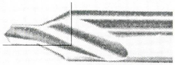
Figure 4

spherical aberration in a spherical concave mirror

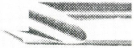
Removing Broken Centre Drill Tips

John Hall called me after seeing Stuart Daniels' article on Drills and Drill Sharpening in AME issue 70, Jan-Feb 1997, page 24. John experienced many broken off centre drill tips by his RAAF Apprentices at Wagga Wagga. He offers his solution to our readers...bmc

Take a new centre drill and grind off the tip. Continue by grinding away one of the cutting edges as shown in the sketch. Use the modified centre drill to cut into the metal around the broken centre drill — be careful with the delicate tip — use a slow in-feed rate and slower revolutions than normal for centre drilling. You end up with a larger centre hole, but the broken tip will simply fall out!

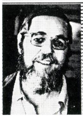


New Centre Drill



Modified Centre Drill

Steam Chest



with Dave Harper

Hi there, steam fans, and welcome to more steam fun and facts. Firstly, some feedback on the November-December 1996 Steam Chest and the annular steam engines.

Richard Atkins of Wanganui, NZ, faxed a query that several other people have raised, namely why are the engines listed as '350HP Collectively' when the text gives an indicated HP of 1540?

I recently had the opportunity to run the question past our boiler inspector while he was paying his annual visit to the Boiler House at Petrie. The inspector, who is an ex-marine engineer, was able to confirm my feeling that the 350 HP is purely a nominal figure calculated by the manufacturer to a formula known only to himself!

This jogged my memory and I pulled out my copy of *Practical Engineer's Handbook* W. S. Hutton 1902 edition. This marvellous old book has a whole section devoted to Nominal Horsepower of Marine Engines quoting numerous formulae used by different manufacturers. There is also a table compiled by two of Lloyd's surveyors listing 18 different rules used in practice for obtaining the nominal horsepower of double expansion marine steam engines!

They all seem to include the square of the diameters of the HP and LP pistons added together, sometimes multiplied by the cube root of the stroke and divided by the number you first thought of!

This seems to be a similar system used by the builders of traction engines, which have nominal HPs quite unrelated to their power as calculated by the classic PLAN formula. (For the uninitiated this is HP = P [steam pressure] x L [stroke] x A [area of piston] x N [RPM])

Even this bears little relationship to the actual shaft horsepower, besides which the power output of a steam engine is mostly controlled by the boiler supplying the steam, among other things, and anyway who really cares?

I also came across a diagram (fig 1.) of a double annular compound engine fitted to an early twin screw steamer in the 1860s. This was in an excellent book called *A History of Marine Engineering*, John Guthrie, Hutchinson Educational, 1971.

I found this book in the Brisbane City Council Library system, and it is one of the best books on the subject I've seen.

It covers everything from the earliest crude steam boats up to the then latest gas turbine technology, and has an excellent chapter on the evolution of marine boilers. Needless to say, I'm on the lookout for a copy for my own library, anyone got a spare one?

Little pumps

I was also pleased to hear again from Arnold Thuys of Port Adelaide, SA. Arnold got a mention in the last issue for sending me information on the Marsh pump. He has kindly sent me more information, saying the book he found the info in was one of the excellent ICS Reference books, this one published in 1907 and covering marine engines and auxiliary gear.

Arnold also sent photos of a model Scotch Yoke pump he has recently built, see **photo 1**, from the UK Model Engineer magazine.

He also included the relevant section from his ICS book. This seems to be interesting stuff, so I'll reproduce it in full:

Flywheel pumps: probably the earliest and still widely used design of a flywheel-pattern independent steam pump is illustrated in diagrammatic form in Fig 2. It is characterised by the absence of a connecting rod, and is known as the Scotch Yoke or the Slotted Crosshead type of pump.

The steam cylinder a, usually placed on

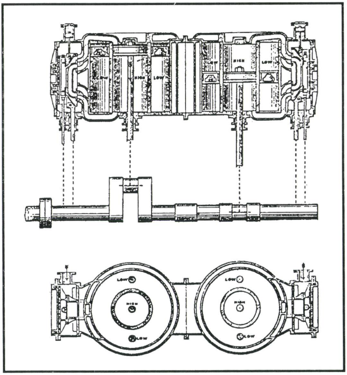


Fig 1. Compound screw engine with two pairs of combined cylinders, working two cranks at right angles. Low pressure cylinders annular.

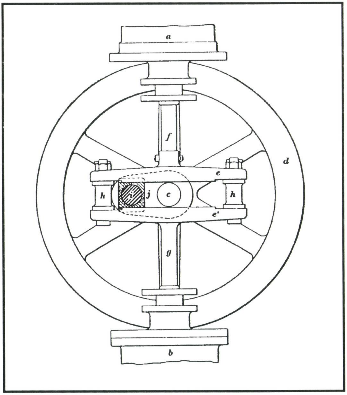


Fig 2. Scotch Yoke or the Slotted Crosshead type of pump.

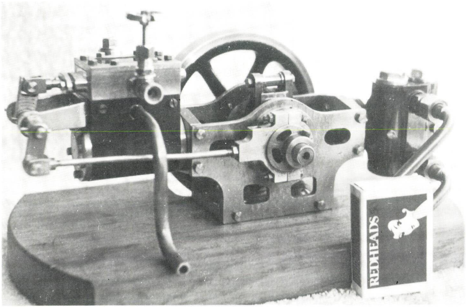


Photo 1.

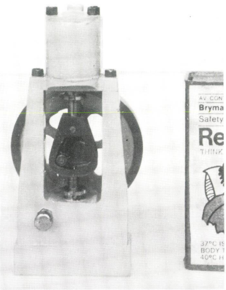


Photo 2.

top, and the water cylinder b, are placed in line with each other. Midway between the cylinders, the crankshaft c, to which is fastened the flywheel d, is carried in suitable bearings.

A yoke, or slotted cross-head, e, e' is fastened to the steam piston rod f and water piston rod g, distance pieces h, h and bolts and nuts holding e and e' together. The crankpin i works in a brass j that is a sliding fit between e and e'.

Unless the brass j is well fitted both to the crankpin and to the inside of the yoke, this pump will make considerable noise when the crankpin passes over either dead centre.

The wear of the brass being quite rapid, it is readily seen that the slotted-yoke pump requires considerable attention if it is to run quietly.

This slotted-yoke pump is very compact and quite economical in the use of steam (in common with other patterns of flywheel pumps); these advantages have caused it to remain quite favourite in English-built vessels in spite of its drawbacks.

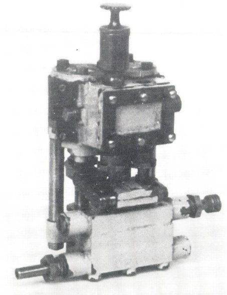


Photo 3.

Speaking of pumps

Naturally brings me to Dave Sampson's speciality. **Photo 2** shows Dave's model Cameron pump which seems to be a very close relative of the Scotch Yoke pump above.

An even smaller model is in **photo 3**. It is a vertical duplex pump, presumably similar to the Worthington type. Dave was upset that the steam valve on top stopped him fitting this pump into a matchbox!

Finally **photo 4** is of a long stroke Weir pump of ⅜" and ¼" bores and ¾" stroke. Dave reckons the longer stroke makes for more reliable operation. I know that one day recently Dave had this pump on display at Petrie and I asked him why it wasn't running. "Look closer" said Dave... the pump was moving so slowly that I had to watch it for several seconds to be sure! This was on compressed air, but nevertheless a very impressive demonstration. I understand that another of our members was also most impressed and is working up a set of drawings for it. I'll keep you posted!

Brotherhood radial engines

Daryl Donohue from Nambour, Qld., contacted me about the radial engines and kindly sent me copies of some engravings from an old book called *Dynamo-Electric Machinery* Silvanus P. Thompson published in 1886! There is a picture of a Siemens compound dynamo driven by a Brotherhood engine.

Daryl also included another picture of an Edison-Hopkinson dynamo driven by Tower's spherical engine. This is our mystery engine of the month — does anyone know anything about Tower's spherical engine? Please pass it on if you do!

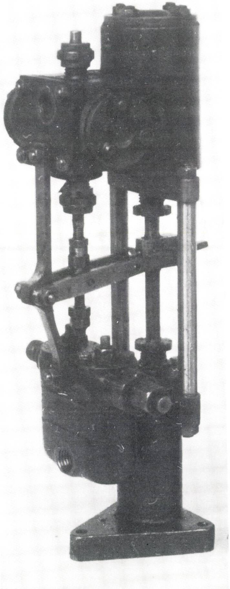


Photo 4.

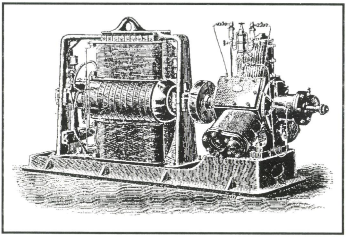


Fig 3. Siemens compound dynamo driven by Brotherhood engine.

That seems to be it for this time around, happy steaming!

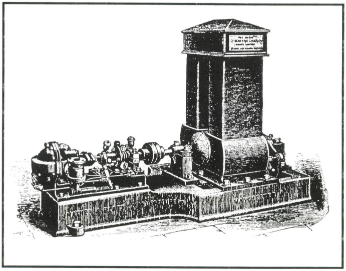


Fig 4. Edison- Hopkinson Dynamo driven by Tower's spherical engine.

South African Steam Arrives in New Zealand

Information supplied by Bill Parker

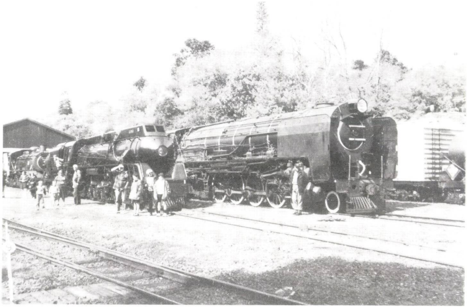
The four ex-South African locomotives purchased by Ian Welch for the *Mainline Steam Trust* arrived in Auckland on August 4th last year and unloading commenced the next day. All four locomotives, once unloaded were moved by low loader to the railhead some 600 metres away and from then on by rail to their new home at the Parnell depot of the Mainline Steam Trust.

It is the intention of the Trust to convert all locomotives to oil firing: one reason is the lack of local experience with automatic stoker firing and maintenance, but the main reason is the high cost of coal, especially so the 25 class with its 18 tons capacity.

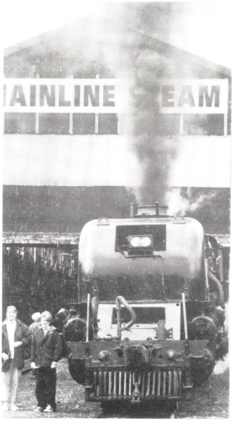
All four locomotives are operable, and have current SAR (Transnet) boiler certificates. However, running of these locomotives will not happen immediately as they will need some work done (air brakes, tyre re-profiling, boiler approvals etc.) and running rights to be negotiated to name but some. It is anticipated that the locomotives will not need major alterations to fit the New Zealand loading gauge. Visitors to the Parnell site are amazed at the sheer size of these engines, even the "baby" class 24 is bigger than a J.

An open weekend was held in September, and, armed with an interim boiler certificate the GMAM was lit up and steamed. It is reputedly a nice locomotive to fire and drive, but, it sure has a big appetite for coal!

Why would this news be of interest to readers of AME? Well, those in Australasia considering modelling a SAR locomotive now have four examples to research close at hand, especially for those who are only a car drive away!



The generous South African loading gauge is exemplified by the massive class 25NC next to J1211. The class 24 2-8-4 is in the background.



GMAM 4088 in steam outside the Parnell shed during September 1996.

A NSWGR Z13 class Locomotive

Some Construction Problems and Solutions

by Neil Matherson

Drawings for publication by David Mottram

In 1993 I decided to build another loco to supplement my NSWGR 27 class which has great difficulty in keeping up the pace on the club track. It is quite happy at 5 to 8 kph but when forced to run at over 10kph it quickly ran out of breath! A loco with larger diameter wheels was needed to be able to run at least 12kph.

When picking out a locomotive design I set certain limits to speed up the process of selection and construction. I have found that the following general criteria works well for me:

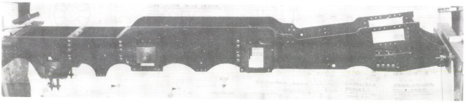
1. Able to be built on existing workshop equipment.
2. Must fit in car boot easily.
3. Must be light enough to be carried by two average people.
4. Should, be different.
5. Should have existing plans and castings available.

To pinpoint the type even closer — besides the larger diameter wheels mentioned above, I preferred a NSW steam locomotive. I consulted Ernie Winter's catalogue and after studying all the options, the 13 class was the obvious choice. There is a full-size 13 class on display at the NSW Rail Transport Museum at Thirlmere. The first step is to have a look at the real thing — the locomotive looks good and it should be possible to machine all the parts in in my workshop, and the completed model will fit in the car!

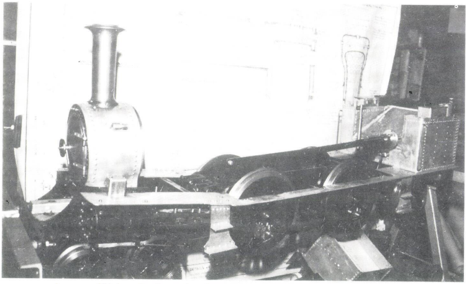
A satisfied Neil Matherson with his latest locomotive creation.

A start is made

In June 1993 the plans and castings arrived. By July the frames were set up in the locomotive rollover stand. I made a start on to the running gear, the driving wheels and axles were no problem although I chose to cut the rear axle with its two pump eccentrics from the solid to reduce the overall diameter and gain more clearance around the ashpan area. The front Bissel truck was made and fitted — disaster!



July 1993 — the frame takes shape.



January 1994 — the frame has been modified. The running gear, smokebox and rear bunker have been fitted. It's almost ready for an air trial.

Problems

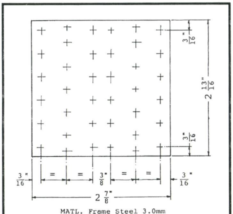
There is only 5⁄16", clearance between the wheels and the frame, this is insufficient for negotiating anything but the most gentle of curves. On the club track which I use, 7⁄16" clearance is required to prevent wheel binding.

The second problem came from the working drawings which show the connecting rod outside the coupling rod. This is definitely incorrect for this engine, and to remedy the situation, it is necessary to move the cylinders inboard by at least 1⁄4" each.

After some thought, I realized that both these problems could be solved by cutting the frame forward of the motion stretcher, but behind the cylinders, and rejoining them using a splice-plate accurately located with dowells. The narrowed forward frame section is attached to the inside of the plate providing the required extra clearance and the correct location of the cylinders. This worked, and gave me plenty of bogie clearance and just allowed the correct placement of the connecting rods.

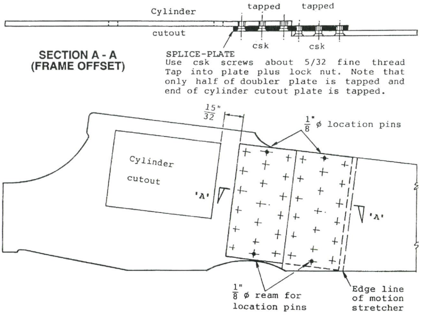
The running gear

By January 1994 the cylinders were machined and fitted. This was quickly followed by the rods and valve gear. The loco ran on



MATL. Frame Steel 3.0mm

SPLICE-PLATE



SECTION A - A (FRAME OFFSET)

SPLICE-PLATE
Use csk screws about 5/32 fine thread Tap into plate plus lock nut. Note that only half of doubler plate is tapped and end of cylinder cutout plate is tapped.

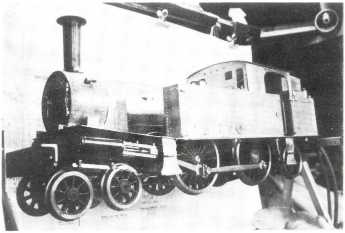
MODIFICATION TO Z13 FRAME

compressed air in February. The smokebox was made to fit narrower at its base because of the frame alteration. The sheet metal work for the side tanks and cab were all made from galvanized steel and sealed with neutral cure silicon and a what seemed like a million rivets!

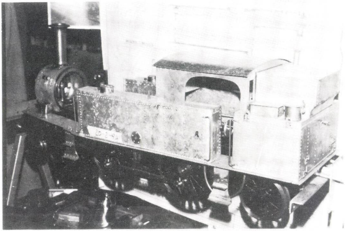
Looking at the loco's cab I could see that driving would be difficult so I decided to make the coal bunker as a removable unit. I made up removable extension controls for the regulator and blower. I also decided to fit the bypass valve in one tool box and the hand pump in the other.

The boiler

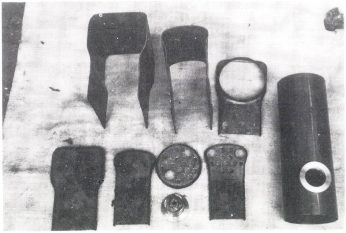
The boiler is always a big job but all the formers' back-up plates were cut from high density particle board (it will last for one or two boilers) and the plates were formed for inspection in March. The parts were assembled for the second inspection in April. The boiler was finished off and the hydraulic test



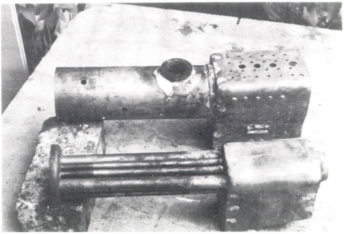
February 1994 — It's ready for an air trial. Note the connecting rod location on the main crank pin.



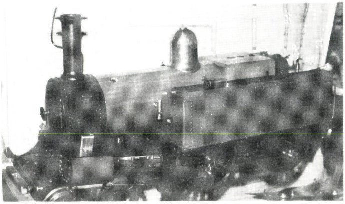
Oh those rivets!



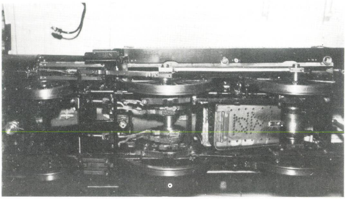
March 1994 — the boiler plates are formed.



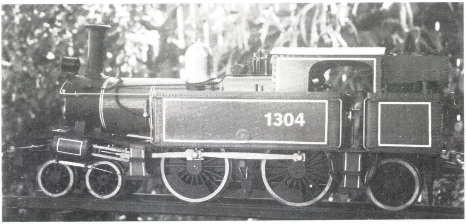
April 1994 — the inner and outer boiler sub-assemblies are ready for final assembly.



The locomotive is painted and taking shape.



A look at the "works" from below.



September 1994 — the loco is finished and ready for action!

was carried out in May.

The boiler was fitted to the engine without trouble but the ash pan took several attempts before its drop-door operation was satisfactory.

The plumbing is fairly simple on this engine, although I have fitted three check valves, one for each axle driven pump and one for the hand pump. The water pumps were modified to the trunk type (as described in AME issue 33 on page 36) to give a longer connecting rod and reduce the pressure angle.

The loco was basically finished in June. For its first run I lit a fire in the boiler while the loco was still mounted in the roll-over stand, then all bolts were checked for tightness.

Test run

At last the engine was lifted out of its stand and sat on its wheels. The final assembly — the buffers, couplings, steps, vacuum and water connections were made and fitted. It's off to the track in September for a private test run. The only trouble I had was a collapsed safety valve, this was repaired and the engine was ready for service.

Final comments

This is not an engine for a first attempt in my opinion. The tank water capacity is rather small so a water gin is essential. It is a fast, powerful engine but I think it is a bit nose heavy — if foot rests for the driver are fitted under the cab, the engine sits very well.

I intend using the Z13 and the 27 to haul scale mixed or goods trains and generally not taking passengers. The narrow gauge $7\frac{1}{4}$"g locos do most of the passenger hauling at our club. However, I can easily plug footboards into the two carriages to carry six passengers if required.

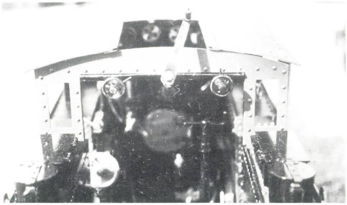
All of my wagons, passenger and goods, are fitted with vacuum brakes in accordance with club policy and the trains will stop in their own length with the regulator still open.

Materials required for modifications:

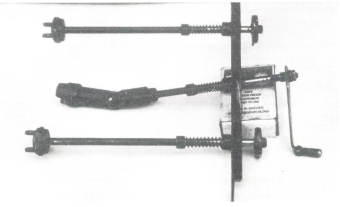
Flat plate $2\frac{13}{16}$" x $2\frac{7}{8}$" x $\frac{1}{8}$" — two pieces for splice-plates.

Countersunk head screws, $\frac{1}{4}$" diameter or 4BA $\frac{3}{8}$" long — 68 required for attachment.

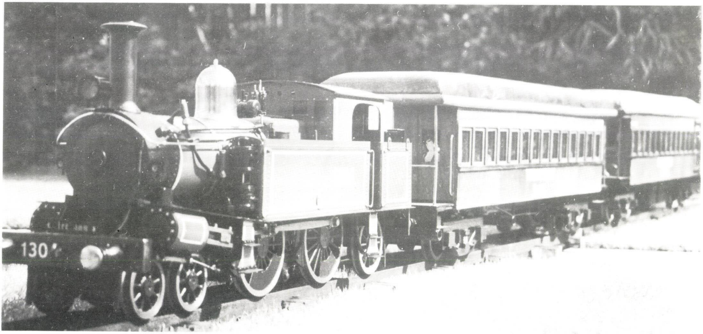
Thin locknuts to suit — 68 required.



A look at the removable cab mounted driving controls fitted to the loco.



The cab controls are sprung loaded on to the handwheels in the cab.



1304 on the Yass Town passenger — Neil's riding cars double as "real" passenger cars. The end car is a NSWGR CCA composite van.

Pins, ⅛" diameter — 8 off. (I used rollers from an old bearing) for dowel pins.

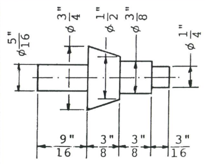
Procedure — refer to sketch

1. Assuming the splice plates are cut to size, mark out all the holes.
2. Drill the tapping size for the selected screws and use a No.31 drill for the dowel pins.
3. Clamp the plates to the frames so that the front edge just clears the rear edge of the cylinder mounting flange.
4. Using the plate as a template, drill through the frame.
5. Ream the dowel pin holes so that the pins are a light drive fit.
6. Remove the plates and carefully cut through the frame leaving equal numbers of holes on the forward and rear sections.
7. On the *rear* part of the *frame* redrill the bolt holes to provide clearance, and countersink on the *outside* for the bolt heads.
8. Similarly, on the *forward* half of the *splice* plate, provide clearance and countersink from the *outside*.
9. Tap all of the remaining bolt holes, i.e. those in the forward frame and those in the rear of the splice plate.
10. Assemble the plates to the inside of the rear frame and the outside of the front frame. Drive the dowels in position and fasten the screws.
11. Tighten all screws, add Loctite® and attach and tighten the locknuts.

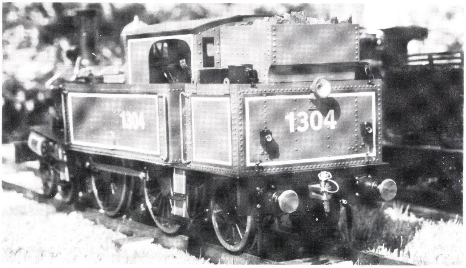
Additional work

This completes the basic modification. Additional work is required as a consequence of the modified layout. Be prepared to carry out the following:

1. The Bissel truck support stretcher must be shortened by the combined thickness of the two splice plates.
2. The front buffer beam frame angles must similarly be shortened.
3. To maintain valve gear alignment, the cylinder port face must be relieved by ¼".
4. The slide bar motion support brackets must be reduced to remain effective. Check before fitting.
5. Similarly, revise the smokebox to suit.
6. Now that the coupling rod is on the outside, the coupled wheel crankpins are required to be longer. Refer to the sketch for details.
7. At final assembly, it may be necessary to correct the alignment of the connecting rod and coupling rod. This should be carried out by adjusting the flanges of the connecting rod and the bushes of the coupling rod.



LONG CRANK PIN



1304 running Bunker first.

How about it?

All you builders of small locomotives have a try — put pen to paper and let us hear of your experiences, after all, biggest isn't always best if it won't fit in your car!

7 Boiler Stays and Soldering

Shop Hints of Peter Dawes

This article on boiler stays is divided into eight parts as listed below.

1. A "stay board" to hold and identify boiler stays.
2. Comments on solder rings.
3. Pickling acids.
4. Swaging rods.
5. "LBSC stay holes".
6. Mounting "studs".
7. Slagwool batts.
8. Tube plugs.

My boiler had over 100 stays of ¼" solid copper. There were many different lengths. Because the assembly of the stays is a job that cannot be done the day before, anything that speeds up assembly and makes it easier on the day of the "big heat", is a very real help. A "stay board" is desirable if there are more than 50 stays and if there are six or more different sizes. It is specially valuable when sizes vary only slightly because the two layers of a boiler slope together at a gentle angle.

The stay board

The stay board is made out of a piece of scrap ¾" (19mm) particle board about 16" (40cm) square. A piece of 3/16" ply or ¼" (6mm) hardboard is cut the same size to make a backing piece for the board to stop the stays falling through the holes. The board for a small boiler can be about 12" square.

Lay out the pattern of the stays on the board as if the whole of the boiler outer shell was opened out flat. Include the front and rear end plates on the board, but do not worry about long longitudinal stays. Scale centre distances down to save space. So use a stay spacing of about ¾" centres rather than the actual 1 1/16" or 1¼" spacing of the boiler. The whole idea is to show their positions diagrammatically and more or less spatially correct but not necessarily to scale.

Note that transverse stays that pass right through the boiler require a hole on both sides but there is *only one piece of copper*, so cross off the second side set of holes, or leave them right off the board.

Having marked the centres for all the stays, drill the board right through 9/32" (7mm) for stays that are longer than about 1¼" (31mm), and about ½" (13mm) deep for stays that are shorter so they will project far enough to grasp. For 7mm use a 7.5mm or letter K drill. Having drilled the holes, sand off the upper and lower surfaces and screw the backing piece onto the board underneath with five screws, one towards each corner and one in the middle. Countersink the screw heads.

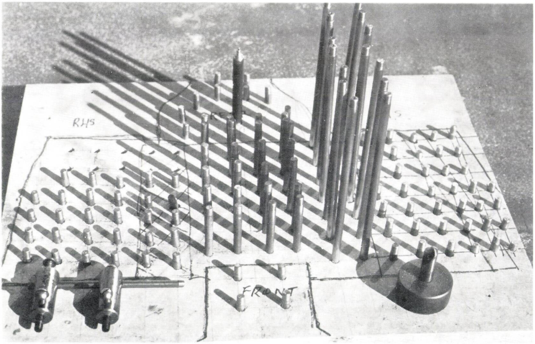
Using the board

As the stay for a particular place on the boiler is finished, put it in the board in the corresponding position. The accompanying photo shows a set of stays in the stay board ready for assembly. Note that these stays have been turned down on one end. This is because my ¼" copper turned out to be 7mm! So I ended up drilling the outer holes 7mm or "J" and leaving the inner holes ¼". I turned a shoulder on one end of all the stays to fit the original ¼" holes. The length of the shoulder determines how far the stay will project inside, so between ¼" and 5/16" is about right, but err on the side of longer rather than shorter because the more the stay projects on the inside of the firebox the better the solder rings stay in place.

In a way, this proved to be a serendipitous advantage because the shoulder provided the ready-made stop necessary to prevent them falling through. I could have drilled out all the holes for 7mm and not worried about turning the shoulders. When it came down to it, I decided it was better to use shoulders because I would only have had to find some other way to provide a stop. There are a number of ways to make stops. One technique is to use a few punch marks about ¼" from one end. Another is to "cut" it slightly with a chisel. Still another is to spread the end of the rod slightly by peening with a hammer. The shoulder is probably the most elegant and accurate way.

Before the day of the big heat, pickle all the stays in small batches made up of different lengths so they can be identified to replace them back in the stay board. However, try a few of them in the pickle before committing yourself to pickling because I found that pickling copper rod wasn't efficient on account of a sort of greasy film and burnished "skin" on the rod. It even seemed to defy 10% sulphuric acid although hot acid might be effective. I now recommend thoroughly removing this skin with new medium grade emery paper while spinning the rods in the drillpress or lathe. Even wire brushing proved unsatisfactory. Handling them one at a time does have one advantage. It ensures that the rods do not get mixed up.

On the day of the big heat, paint the ends with flux and put into position (it is assumed that the boiler has also been suitably prepared, with holes reamed, pickled, and fluxed).



The stay board.

LBSC's stay holes

Getting the other ends of the long stays into their holes is not an easy job at any time, but it will be helped by having all stays correctly identified and ready to put in place. The job is made easy if a hole is drilled in one end of each long rod, 1/16" diameter by 1/16" deep using the tip of a small (No 2) centre drill, or any small stubby drill. The hole must be in the end that has the "stop". A hole is unnecessary and indeed is quite irrelevant in the other end.

Using a pointed probe poking through the hole in the boiler , pick up the end of the rod and guide it into line. Tap the opposite end to press it through.

I am told that LBSC described this idea years ago. A probe for LBSC's holes is shown standing up at the back centre of the board in the photo. The tip should ideally be about 1" long with a longer trumpet-shaped taper than the one shown. "LBSC holes" are recommended for all stays longer than 4 inches and especially for long longitudinal stays. If you are using hollow stays then a pointed "bullet" made to fit the stay hole in the same style as those for assembling fire tubes, is an even better way to find the hole in the other end of the boiler. So that you don't lose it inside the boiler, this bullet should be a moderately tight fit in the hole in the stay rather than a loose fit as the fire tube bullets are. Its outside diameter should be just less than the stay diameter. Straight heavy-wall ¼" copper tube for making these hollow stays is available but is neither plentiful nor cheap. It has a bore of approximately ⅛". Used as a stay it should of course be left fully hard, not annealed at any part of its length.

Solder rings versus direct stick application

The stays can be soldered either by means of preformed solder rings, or by direct application of the solder stick. While optional on the outside, rings are strongly recommended inside the firebox, simply because it is very difficult to feed the stick *and* manage the flame in the cramped space.

Rings have another important function: they precisely "meter" the solder to each joint so that if a joint shows a normal fillet you know it is a good joint. My experience is that a good fat fillet is much better than a lean and skinny one. If it is a smooth even curve it is almost certainly a good joint. If it is uneven and lumpy it may be a bad joint, though not necessarily.

Making rings

Rings are undoubtedly the best method for the less experienced welder, while the advantage of stick application is that it's faster overall when account is taken of the time it takes to wind, cut and flatten them. The closest stock size of mandrel for winding ¼" rings is 6mm BMS and the best size for winding 7mm rings is ¼" assuming the coils are wound tightly in the lathe. These yield close fitting rings. If loose rings are required then use somewhat larger diameter mandrels.

One stick of CIG "245" winds about 27 rings in a close-wound coil 2" long, so a mandrel about 2½-3" long (plus chucking length) is ideal. Drill a 3/32" cross hole at the chuck end to take a short sharp bend in the wire to fix the end while winding. Countersink the inlet side of that hole so its edge doesn't cut the stick. Drill a centre hole in the outer end for support in the tailstock centre. One of us (JP), found in some experiments that the solder rings seem to flow better into the joint if they form a nearly closed circle than if there is a gap. This is possibly because the complete ring is less likely to break into widely separated globules which can then roll away.

Suppose there are 60 quarter inch stays. That's 120 ends, so you would need five sticks of solder for that job, leaving a bit for "topping up". If you strike a place where the joint gap is too wide to hold "245" then the job can be saved by having some "235" quickly to hand, but you need to turn the oxy-propane torch up a notch for this higher melting point alloy. Its special feature is that it's a better gap-filler.

Wind the solder wire coil tightly at the slowest speed in the lathe. Don't hold the wire in your fingers when it comes close to the end because it whips round and can take a bit out of the finger as I found to my cost. A "die" to apply tension and feed the wire is the safest way. For example, clamp it between two pieces of hardwood. Cut the rings apart with big end-cutting nippers.

The use of rings means that the surface being worked on must be placed horizontally for the rings to stay in place. With this method, it will therefore take three heats *each* to do the inside and outside surfaces of the firebox wrapper — five if you count the two ends.

The direct stick application method doesn't have this disadvantage so the outer ends of all the stays could conceivably be done in one heat. But everything depends on whether the flux lasts the distance. If the flux is damaged by the heat then the job must be broken up into multiple stages. Use CIG (now BOC) "GP" silver soldering flux ($7.00 for 200gm) or an equivalent other brand, because it stands up better to the heat than the other types.

Pickling time is probably the biggest single factor determining how long such a job takes, so reducing the number of picklings is the most significant way to reduce the total time required. See discussion below where it is shown that sulphuric acid can be used to reduce the time in the pickle.

Two items you should have when doing stays and tubes, and probably won't anticipate, are:

a) A very long handled brush to apply the flux inside the firebox;

b) A really long pair of forceps or pliers to hold the rings to drop them into place in the deepest part of the firebox. This is an awkward job when the boiler is hot.

The swaging rod

At final assembly and *before* adding the flux to the outside (because it obscures the view), tubes should be swaged out to close any gaps between them and the holes and a "swage rod" is used for this. Provided the holes were well-deburred both sides, it doesn't seem to matter how tight the tube is in the hole. In fact we found that it seemed to be a case of the tighter the better.

The swage rod is just a tapered piece of black steel rod about 8" long or more. For ½" tubes the taper should have a minor diameter of about ⅜" and a major diameter of about ½". It should have a taper of about 5 degrees half angle but this is not at all critical. What is important is that the tapered part is highly polished and that the end is smoothly rounded. Swage sticks for 1" superheater tubes are made similarly.

Pickling acids

I had previously used phosphoric acid and found it okay. This is ortho phosphoric acid (H_3PO_4) — also known as "syrupy" phosphoric acid. We recently tried citric and sulphuric acids and it is these I will describe now. Do *not* try to use nitric acid. It is an oxidising acid and is most definitely not suitable.

We found that while citric acid is quite effective, the strength originally advocated by Ted Jolliffe (M.E. Sep 1991 p319, #3905) is too low and can be doubled. Its advantages are ready availability (supermarkets), modest cost (70 cents per 50gm), ease of use, safety, and the near impossibility of damaging the job by over-pickling. It does deteriorate relatively quickly being an organic acid. Surprisingly, in a matter of a few weeks, moulds will grow quite well in it thank you very much.

However be prepared for long pickling times with it. If the staging of a job requires lengthy time between heats then this is no problem and citric acid is to be preferred for convenience and safety.

On the other hand if you have a team working on a job, such as doing the stays and requiring many short heats, then pickling time must be minimised for the sake of all concerned, and then we can recommend 10% sulphuric acid — prepared with due care of course. Concentrated H_2SO_4 is a very heavy liquid (S.G. 1.8) and the concentrated form should be transported doubly protected to guard against even a remote possibility of leakage. It would be obtainable from industrial chemical supply houses.

If starting with concentrated acid you must add the acid slowly and carefully to the full volume of water, *not* vice versa. Use a heavy duty black plastic 5 litre drum or something similar. If starting with battery acid of 33% strength this is no longer such an important issue, but on principle you should always add acid to water — and slowly at first. Always wear eye protection with acid because even a tiny splash can cause corneal damage with very painful and serious ulceration requiring *urgent* medical treatment.

Use a plastic apron to protect your clothes, and acid resistant gauntlet gloves, especially when lifting things in and out ($4.50 a pair at the hardware store).

Battery acid should be obtainable from battery manufacturers. It cost me $1.50 per litre — supplying my own polythene container. Sulphuric is not nearly as readily obtainable as citric and cost-wise I found it slightly more expensive.

Take great care with sulphuric acid — it's nasty stuff. Ten percent final dilution from "concentrated" is approximately right and it's not at all critical. Note that ten percent means *one* part by volume to *nine* parts of water by volume so that it ends up as a *final* volume of 10 parts.

However the final volume is not exactly the sum of the parts because a chemical reaction occurs between the concentrated acid and water. This is an exothermic reaction — ie it gives off a lot of heat, which is what causes most of the trouble during the diluting. This volume difference is unimportant.

Starting with 33% you would add *one* gallon of acid to *two* gallons of water to get about *three* gallons of 10% solution. For those not familiar with chemistry, the idea is that a 10% solution means 1 *in* 10 not 1 *to* 10. (1 gallon = 4.546 litres).

While you can put your hands briefly in citric acid (be warned though, it will sting in any cuts), you *must* use good plastic gloves when working with sulphuric.

If a job is put in while hot — but *never* spitting hot, say around 100 degrees celsius — it will pickle almost instantly if the acid is reasonably fresh. Otherwise, if you can find a way to heat the acid up to somewhat below boiling point beforehand it is even better. Unfortunately I don't know any good way to heat it because it's not feasible in a microwave oven, and it cannot be heated by a metal-encased electric heating coil (unless it's gold plated!). The acid should be held in a plastic container and that means that neither can it be put on a stove.

Commercially, I'm told that it is heated by steam piped in via lead-encased steel pipes. This is hardly feasible for the modeller.

Note that even the vapour that is given off from hot acid is pungent, irritating, and toxic to the lungs if inhaled. But the advantage of hot sulphuric is that you can start working again within minutes.

One problem we encountered was that the copper started to darken and discolour within hours of pickling in sulphuric acid. We haven't found the reason for this so we can only recommend that you pickle early on the same day that the soldering is to take place. It was less noticeable with citric acid.

To clean small areas for repairs to the boiler, use a plastic bristle brush to brush on the acid in just the areas of concern. It's a waste of time, copper, and acid to dunk the whole boiler. When it has had the desired effect rinse the brush in clean water and swab down liberally with clean water. Finally wipe off with a damp cloth to remove remaining acid and dry it off. But don't do this the day before unless you have to remove bad oxidation. The copper will discolour again overnight although it does pickle very quickly and easily next time. I am using an IBM typewriter golf-ball cleaning brush but I do not know where they are obtainable.

Boiler mounting "studs"

Attaching mounting brackets to the boiler for the regulator, the manifold, the firebox door, and for the main boiler support brackets, is a real problem. Screwing into the boiler shell and soft soldering the bolt to seal it cannot be recommended. A solution in Model Engineer recently is a good one. Keith Wilson showed these studs on a Swindon boiler, page 354 in *How To Make 'Em* Pt 56, 17 March 1995.

Make small shouldered plugs out of ½" solid bronze (*not* brass) similar to regulation bushes except they don't have to obey the code because they aren't structural components in the boiler sense. However if you want to save space or bronze you can make them do double duty but then as the primary requirement they need to obey the code for both dimensions and spacing.

The minimum length is about 5/16-3/8" long. Turn the outer diameter to suit the job and the space available. Drill and tap blind holes in the outer ends for suitable bolts, which may range in size from 6 to 2 BA.

For light duty the studs may be short and silver soldered only into the outer layer of the boiler casing. For great strength (such as for main support brackets) they can be made long enough to pass through both layers of the firebox. But avoid "through" studs where inside access for soldering is difficult.

If not "code", they require a shoulder only to stop them falling through while soldering. This can be very thin if you want the bush nearly flush, or wide if you want the attached part to stand off the surface.

The use of slagwool batts

Try to decide where you want Keith's studs and solder them in well before final assembly of the boiler, and certainly before the tubes have been fixed into the front tubeplate. A boiler that is reheated after the tubes are fixed in at both ends runs a real risk of differential expansion and contraction breaking one or more tubes. This doesn't arise when a boiler is heated full of water because the water ensures a constantly uniform temperature throughout.

Therefore we recommend that immediately you have finished soldering the tubes into the front tubeplate, *quickly* wrap some slagwool batts around the boiler (including even its stand if relevant) and tie them loosely in position with rope. Leave the whole thing to cool slowly and uniformly. It will take two or more hours. If you don't use this insulation you will hear a succession of creaks and groans from the boiler as it cools. These mean that strains have been created and are being relieved, and should be taken as a sign that the boiler is not happy! Think of them as a sign of PAIN! Adding the batts will stop these completely by slowing down the process of cooling to a rate where the conductivity of the copper can keep pace with the loss of heat from the outer surfaces. It allows the temperature of the whole boiler to remain equilibrated. In a way, it is taking the place of the water.

Three "wall" type batts should be enough to wrap around an average boiler. Use the "stiff" type either 3" or 4" thick, rather than the soft fragile "woolly" type, because they are stronger and easier to handle. The Bradford Insulation Co makes "yellow" batts 75mm x about 1160mm x 430mm (46" x 17") supplied compressed into big plastic bags of sixteen. These are ideal and you should be able to buy them loose for around $1.50 each. They can even go into the ceiling when you've finished. Pink batts would also work but are softer and somewhat more fragile. We aren't concerned here with such details such as "R" values. Any type of batt made of glass wool will be found to be irritant to the skin whereas slagwool batts are only minimally irritant.

These batts do not take kindly to direct flame. They crumble and give off fumes even though they are technically non-combustible, so avoid using them during the actual heating or at least keep them well away from the reach of the flame.

Batts should always be used during any reheat involving the barrel once both ends of the tubes have been fixed into the tubeplates.

The batts are also ideal when you have to pick up a hot boiler to turn it over to work on another face. Just wrap a batt around it, and wearing leather gauntlet gloves, grab it in your arms. Because this is very quick, it saves valuable heat.

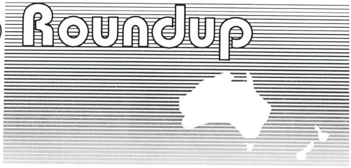
Tube plugs

Kozo Hiraoka recommends plugging the ends of the tubes when repairing tubeplates. We think this is a good idea. The asbestos rope he uses is unobtainable in Australia and the only substitute I know of is the glass fibre rope used to seal doors on slow combustion stoves. It will not stand direct flame heat like asbestos but it works OK inside the tubes. This material is available from heating stove suppliers in nominal diameters up to 12 or 16mm. For ½" tubes the 12mm size can be cut into 30-40mm lengths and worked into the tubes by twisting. It is somewhat fragile and will unravel if handled roughly. Alternatively you can use twice that length of a smaller size and fold it double. It doesn't help to heat-seal the ends of the rope because they become brittle and simply break up. To plug 1" flue tubes, fold two pieces of 12mm in two and push the four thicknesses down together. He pushes them down the tube about 80mm but I prefer 20 to 30mm. That reduces the length of tube that will be heated up and therefore the potential for differential expansion to break a tube. Of course, the heating of the outer boiler shell must be limited to an equal length. In other words, try to heat the tubes and the outer shell equally as far as both distance and temperature are concerned.

As before, when the job is done, wrap the boiler up in a slagwool bat. The plugs can be tapped out with a 3/8" dowel and with reasonable care will last for a number of uses. Finally a reminder to remove all traces of residual flux from the finished boiler — inside and out.

[Note that the "we" referred to above made a great team. We were: Peter Brown (scheduler, whip-cracker, and first torch man); Jim Price (job planner, inspector, ideas man, and occasional second torch); Wally Thorncraft (contributed and supervised the retort stand idea with upside-down firebox for doing the tubes in the firebox tubeplate); Bob McKinney (scratch-stick man, assembler, occasional second torch); The writer, (builder, assembler, general welder's labourer, chronicler). Everyone learned from the exercise.]

Club Roundup



compiled by David Proctor

Townsville Qld

A recent inspection of the site by the Townsville City Council parks and gardens people had a happy outcome for all concerned. The council have undertaken to perform some maintenance tasks and are very supportive of TDSME. Vandals have hit again, this time damaging the water tower, and coaling station as well as smashing windows in the toilet carriage. (There is probably a good psychological reason why vandals are always attracted to toilets!)

Townsville and District Society of Model Engineers Inc
Location: Boundary Street, Townsville South
Public Running: Last Sunday

Budgewoi NSW

The track was officially opened on 27 October 1996 after three years hard work. It is 250 metres long, with turntable, four steaming bays and a 9.75 metre traverser for unloading trailers and placing engines in the steaming bays. There are three short lines from the turntable for holding waiting engines.

The track is 5" gauge only and runs mainly through light bushland. The only level spots are the turntable and about 9.1 metres of track. A run around the track commences with a climb, over an 24.4 metre curved trestle bridge, into a long bank (which will test the locos), over two short viaducts on a long curve, and into the downhill run to the points and back on to the bridge to the station, yet to be built.

The next section has been surveyed and a track cut through the bush to allow earthworks to be commenced shortly. Being a private club it is not open to the public. Visitors are welcome and can contact the Secretary, Maurice Rachow on (043) 422 906.

Twin Lakes Railway
Location: *Yellow Rock* MacLeay Drive, Budgewoi
Public Running: None

Mangere (Auckland) NZ

Manukau, like other New Zealand clubs has been feeling the effects of a very wet winter. A spring has been pumping volumes of water into the first cutting and making the track footings soft. The problem was alleviated when an old drain hole was uncovered which feeds directly into the stormwater drain. The laying of drainage pipe and two sumps should keep the flow away from the track.

The top steaming bay opposite the station has been modified to allow easier access for unloading small 7¼" engines and to reduce congestion from the two steaming bays by the bridge. One of the 5" bays is to have a 3½" track added and the public barrier is to be extended.

A competition was recently held to choose a name for the club newsletter, which is now called *Steamers and Dreamers*.

Manukau Live Steamers Inc
Location: Mangere Centre Park, Robertson Road, Mangere
Public Running: Every Sunday

Maryborough Qld

The number of visitors and model exhibits at the Spring Festival was down a bit this year, a reflection of current economic times. It was however a good weekend with a good variety of models on display. The Kuskie Award and Locomotion Trophy for a completed model was won by Barry Andersen for his 5" rebuilt LMS Royal Scot, while Don Reid from Townsville collected the Lynton McWatters Award for his incomplete 5" NER *Netta*. It only needs a coat of paint to complete, but maybe Don likes the colour of brass!

On the 3'6" gauge, the QR guards van has been loaned to the Mary Valley Heritage Railway at Gympie on a long-term basis. B15 locomotive No. 299 which carries Walkers Limited builders plate No. 1 reached its centenary in January and was steamed for the occasion, running through Queens Park on the Wharf Street branch.

1997 is Maryborough's sesquicentenary (150) year, and MELSA features throughout the celebration calendar. A busy year ahead!

Model Engineers and Live Steamers Assoc.
Location: Queens Park, Maryborough
Public Running: Last Sunday

Wilson WA

The Castledare special run for Princess Margaret Hospital was an outstanding success. Proceeds were sufficient to purchase a "Kangaroo Pump" for the hospital. This is a machine designed to accurately measure the dosage of drugs being infused into a patient. Staff from the hospital assisted on the day and there were several supporting attractions on site including the WA Machinery Preservation Club, A Model Ford Club, WA Fire Brigade, WA Police, the Perth Concert Band and several craft stalls. It is intended to make this an annual event to support the kids in hospital.

It was decided to do something totally different in October, namely bi-directional passenger carrying operation on a single line railway under the Train Staff system of safeworking. Train services were crossed and changed the staff at Paperbark Loop, Wilson Station and Bullfrog Loop in order to have only one train occupying the section at any one time, just like the big ones. Sixty three trains were operated, thirty four down and twenty nine up, with an average of 21.9 passengers and the average circuit time was about twenty minutes.

Castledare Miniature Railway
Location: rear of 100 Fern Road, Wilson
Public Running: 1st Sunday

Gore NZ

The mid-winter run was a reasonable success with a few hardy souls braving the weather. When temperatures are recorded as low as -13.5°C the loco exhausts must look most impressive.

Gore Model Engineering Club Inc
Location: Hamilton Park, Gore
Public Running: Unknown

Warner Qld

QSMEE have acquired *Uranus* wrongly thought by some to have been designed by LBSC. She was the brain child of a well known Canadian model engineer of the 1920s and 30s, James A. Joslin of Toronto, who designed quite a number of 2½" gauge locos, most of which were referred to by LBSC in his columns of the time. *Uranus* is a GWR 3 cylinder 4-8-4 express type.

The modern toilet facilities for the club are finally becoming a reality. Not all, over the years, have appreciated the rustic beauty of the corrugated iron shed complete with pits or the telephone box that even Superman avoids. Excavations have been made and boxed,

Club Roundup contributions

AME is pleased to receive club newsletters for consideration in this section. Newsletters are often a good source of articles, which we appreciate all the more, but most of all they help us keep in touch.

It is often difficult to decide what to publish and what to leave out. and the task of selecting material for a wider audience takes a lot of time. Also, there is always the risk that AME will publish something that the club considers sensitive. Please help by sending a "press release" page with your newsletter, or highlight the items you think we could use. We'll give first preference to clubs that help us out this way.

bmc

ready for plumbing and then the concrete footings and slab for the new toilet block.

On the track... the second station track is now connected with the platform 1 branch at the station exit, before it joins the main. This will become platform 2 when the station is remodelled. 2½" gauge is again continuous on the elevated track, and widening of the bridge and culvert decking is complete.

Queensland Society of Model & Experimental Engineers Inc
Location : Lot 5, Warner Road, Warner
Public Running: None

Upper Hutt NZ

Fund raising for the ground level railway project has been successful to the extent that MMES members now have sufficient funds for the concrete foundations and at least half the track. Work is about to start on what will be the club's biggest project since the construction of the elevated track in 1968. On top of this the Dept. of Labour have advised that they will renew the registration of the railway as an amusement device, which in NZ is a licence to operate.

Members provided a display in the Wellington Tramway Museum's *Hot Air and Sparks* vintage transport carnival. The event was staged by the Museum to raise funds towards installing a fire sprinkler system. The Maidstone members provided a static display of members' work and a portable track with steam locos and rolling stock. The displays included an Allchin traction engine along with several locos and stationary engines. From other organisations there were seven full sized traction engines and rollers, vintage cars, vintage machinery and model electric trains to be seen and the portable track was in continuous operation throughout the two days.

Maidstone Model Engineering Society Inc.
Location : Maidstone Park, Upper Hutt
Public Running: Unknown

Tauranga NZ

With Expo 88 only a year away now interest is growing, evidenced by responses from Germany and Holland. Model magazines in both of these countries are advertising the event extensively. The track extensions are on target to be ready, with the loop and spur completed and plans are well in hand ready for work to commence on the extension. The council have requested that the third cutting be changed to a long tunnel. This will allow them to place one of the new items of playground equipment above it, and they have offered to finance it.

Tauranga Model Marine & Engineering Club Inc
Location : Memorial Park, Tauranga
Public Running: Every Sunday

Fairfield West NSW

The Village Open Day was a big one for the folk from Western Districts LS. After a solid effort the previous week the track and grounds looked great and the only concern was rain on Saturday night and Sunday morning. The show grounds manager said that better weather was ordered from 10 o'clock onwards. At 10 o'clock the clouds broke up and the rain ceased and the grounds manager obviously has missed a great career with the weather bureau, or maybe he is too accurate! There was a good line up of people for rides and trains were kept busy on two main tracks. Much interest was shown and many questions asked by the public so hopefully there may be a few membership applications forthcoming.

Western Districts Live Steamers Co-op Ltd
Location : Fairfield Showground, Smithfield Road, Fairfield West
Public running: Every Saturday

West Ryde NSW

A list of all members of SLSLS, past and present has been compiled and is on display in the clubhouse. It is interesting to note that of a total of 142 members over 48 years, 69 are still members — almost half!

The arrival of additional 5" gauge locomotives over the past few months has shown up a requirement for additional elevated passenger carriages. One new carriage has been completed and now the whole fleet are to get some attention. As all passenger carriages are to be braked, the modifications to fit braked bogies has meant that the carriage riding heights have to be changed. The intention is to fit all of them with new end beams and all vacuum pipes will be located in one standard position and protected by dumb buffers. The use of commercial pipe fittings has made the job easier and bulkhead fittings will enable a speedy change of pipes if necessary.

Of late drivers have kept the train speed down to a very realistic rate providing a spectacle in sight and sound. Even members of the public have made favourable comments about the realism of the slower running (not a bad idea from a safety point of view either).

Sydney Live Steam Locomotive Society
Location : Anthony Road, West Ryde
Public Running: 3rd Saturday

Auckland NZ

The ASME's AGM saw little change in the line up of officers for 1997, which in this hobby means they are doing a good job or else no one else wanted to take the job on. In this case it would be the former!

An item in the ASME Newsletter headed *World's last war memorial locomotive to steam again.* Ab 608 was chosen as NZ's war memorial locomotive in 1925 when it was displayed at the New Zealand South Seas Exhibition in Dunedin. At the time 608, the very first of a celebrated class of NZ Railways pacific class express locomotives, was named *Passchendaele,* after one of the bloodiest battles in which New Zealanders took part during the First World War. Now, after having been out of service since 1967, *Passchendaele* is being restored to mainline running standard, a project supported by the NZ Returned Services Assoc.

Auckland Society of Model Engineers Inc
Location : Peterson Road Reserve, Waipuna Rd, Panmure
Public Running: Every Sunday

Edgeworth NSW

A new flag pole has been erected near the 7¼" station. It is intended to place a plaque at the base of the pole containing the names of deceased members of the club. In an effort to curb the amount of graffiti appearing at the club two murals have been painted by a local artist. There are two cartoon steam engines, one on the back of the toilet block *(No comments about appropriateness of location)* and the other is on the door of the loco shed.

Further work on site includes a concrete pad at the unloading area of the 7¼" station, continuing work on sidings for 7¼", fencing, and track maintenance on 5" and the elevated 3½" including replacing bolts and fishplates. A family of green tree snakes has taken up residence in the roof of the Nooroo signal box.

As well as their own club activities, 14 members attended the Blowfly Rally in Mudgee and a large contingent helped HME celebrate their birthday weekend on the Galston Valley Railway.

Lake Macquarie Live Steam Locomotive Co-op Society Ltd
Location : Off Velinda Street, Edgeworth
Public running: Last Sunday except December

Galston NSW

The annual Birthday Weekend (23rd) proved very popular again. Friday was an inter-club day, well attended by other clubs. Lake Macquarie alone had 32 members with families and several locos. The display of models was well supported, both in number and variety. The awards were:

- Best Railway Model — Reg Watters for his semaphore signals
- Best Marine Model — Alan Fern for his RAF Pinnace
- Best Non-Railway Model — Roger Lainson for a freelance steam tractor. Some details of this model are: a locomotive type boiler, twin cylinder marine engine, the configuration of a traction engine with the chassis and pneumatic tyres of a farm tractor.

One indication of the size of the event is over eleven hundred sausages and 15 kgs of onions cooked, and 65 loaves of bread eaten.

The marathon driving effort of the weekend would be Dallas King's 21 laps of the track (21 kms) on one tender full of water. The trip took one hour and fifty-six minutes.

Hornsby Model Engineers Co-op Ltd
Location : 29 Mid Dural Road, Galston
Public Running: 2nd Sunday

Mid North Coast NSW

At present a club has been formed with 15 members. Within this group two other railways exist. One is a large 7¼" gauge railway at Sth Grafton and the other is a large jointly owned 5" gauge railway/tramway near Coffs Harbour. The private tracks are operated by the members — there is no public running. Visitors are always welcome.

We are keen to meet like-minded people in the area, or should you consider moving or retiring to this part of the world — look us up — we'll help you make the decision!

Even if you haven't got a loco as yet, we have plenty of locos for you to drive, signals to pull, or trains to control. The accent is on "playing trains", with good mates, without the fuss!

An affiliation with the AALS and AMBSC has been sought.

For more information write to Bob Farquhar, PO Box 17, Repton, NSW, 2454.

Coming Events

1,2 March
Great Little Train Show
Invercargill NZ

1,2 March
Palmerston North NZ, open weekend.

8, 9 March
Open weekend, Taurunga NZ
Members of the Taurunga M&ME invite all model engineers to a fun weekend at their track in Memorial Park.

8, 9 March
Scoresby Steamfest
1200 Ferntree Gully Rd, Scoresby

28 to 31 March
AALS Convention, Railway Park, Cobden Vic.
Contact Sec. Ian McArthur, 14 Peter Street, Cobden 3266 (055 951195)

28 to 31 March
Hevelock North NZ, Easter meet.

1 April
SLSV track at Moorabbin track operating for Convention visitors.

17 to 21 April
Maitland Steamfest NSW
Lots to see and do for the steam enthusiast. Contact: Bob Neal (049) 32 8507 (9am-Midday) or Maitland Visitors Centre (049) 33 2611 for further details.

26, 27 April
MELSA Maryborough Qld
Invitation run, Sunday open to public. Everyone welcome!

17, 18 May
Gisborne Vintage Engine & Steam Rally, Gisborne Steam Park
Open to public 10am to 4pm . Adults $5, pensioners $3 children under 16 free. Camp sites avail. Fri to Sun.
Features steam engines, vintage vehicles and machinery, models, train rides. Hot food and drinks avail.

17, 18 May
***Sweet Pea* and *Blowfly* Invitation Run**
Coincides with annual Kindred Society Run which has been extended due to popularity. Local and interstate visitors bring your 3½" and 5"g locos.
Tea, coffee and friendly hospitality provided. Enquiries (03) 9553 4037 (SLSV) or (03) 9580 1408 (Ken Rofe)

22 to 25 May
Hare & Forbes, George St. Parramatta, NSW, 4th annual sale and model engineering display
See metal and wood turning demonstrations by experienced operators. Rotary club barbeque. Hornsby and District Model Engineers Society members' display of projects. Many great tool and machine bargains!

7 to 9 June
Hot-Pot Run — Wollongong
You are all invited to a winter run over the Queens Birthday weekend at the Illawarra Live Steamer's track, Virginia St. North Wollongong. Condition of entry: two cans of soup! Contact: Ian Kirby (042) 29 2918 or Warwick Aston: (02) 9520 8186. (2½", 3½" and 5"g. elevated, 5"g ground level track)

4, 5, 6 July
Montreal Live Steamers, Quebec, Canada. IBLS Commemorative Meet
To be held in the Canadian National Railway recreation grounds in Lachine, Quebec. Track gauges available 3½", 4¾", 5" elevated and 7¼" ground level. Contact Montreal Live Steamers Corp., P.O. Box 451, Pointe Claire, Quebec, Canada H9R 4S6.

5, 6 July
Bendigo National Exhibition
The Bendigo Society of Model Engineers are holding a national exhibition at the Leisure Centre, Kangaroo Flat. Organised by Events Bendigo. Further information from:
Peter Robinson (03) 5447 8667 or Events Bendigo, Stephen Cole, Phone: (03) 5444 4144, Fax: (03) 5443 4268.

8 to 12 January 1998
International Model Engineering Expo, Tauranga NZ
Model exhibition, hobby displays, working demos, road vehicles, railways 2½", 3½", 5" and 7¼" gauges.
Registration forms now available from:
Expo 98 Secretary, 326A Devonport Road, Tauranga NZ

Bendigo Vic

Our photo and video day on 1 November 1966 was spoilt by heavy rain all day This didn't stop us filing up the steam loco and enjoy getting thoroughly soaked! On the next evening we ran steam again for the Bendigo Society of Model Engineers' meeting and got thoroughly frozen! The following weekend we ran the loco again for the local residents and their children Many had *never* seen a steam loco of any size before! With fire restrictions in force we cannot run steam again until autumn.

The new extension (branch line?) is complete and last the phase of crossing the creek is well on the way. This will give us 1.2km of point-to-point trackage. Stringing the overhead wire is progressing satisfactorily. When the construction is finished we will formalize the setting up of the club with office bearers, incorporation and AALS affiliation, Up to date we haven't allowed democracy to get in the way of construction! New members and visitors most welcome.

Contact: John Beckett (03) 5446 1742 or email: tramway@hitech.com.au

Woodvale 7¼"g Electric Tramway
Location : Jobes Lane, Woodvale
Public Running: None

Prospect SA

There were a lot of improvements made to the grounds and amenities during 1996. Among these have been the installation of a sprinkler system to water the eastern ends of the grounds, and a new fence installed along the edge of the marshalling yard to the eastern crossing. The steaming bays and outside seating were painted and also the exterior of the clubrooms. Generally tidying things up rather nicely.

A large new sign was erected outside the front fence making the grounds more noticeable from Regency Road. The Public Address system was overhauled and repaired, and a signal indicator system installed near the eastern crossing, giving signal indications with respect to the signals on the gantry, thus making a block section.

The ticket office was moved back nearer to the main gate and a yellow line painted at the crossing to regulate the access of the public. Two security lights were installed on the speaker pole near the truck shed.

During the course of the year excellent public attendances were recorded on Field days, possibly due to the good weather in conjunction with the new sign near the front gate.

The Adelaide Miniature Steam Railway Society Inc.
Location : 370 Regency Rd, Prospect, South Australia.
Public Running: 4th Sunday

Tracks 'n' Trees

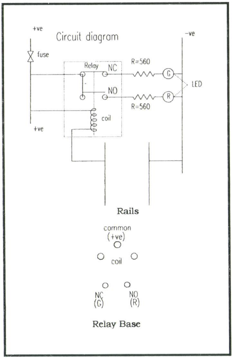
Signal Systems

by Bill Fowler

On all garden railways the part that looks and makes a railway are the signals and turnouts. It is relatively easy to add a signal system to control a section of line say through a tunnel, blind curve, for single line working or for block working for those lucky enough to have a double track mainline. The majority of signal pick-up on full size railways is shorting out across the two rails. One rail has a continuous charge (i.e. negative), the other is isolated into sections. On your garden railway nominate one rail as continuous and the other as pick-up. To break up the pick-up rail you will need some form of insulating rail joint. One system used is to have a double width sleeper and spike the ends of the rails apart, add an insulator between the rail ends. Araldite or the like will do to stop the rail ends touching due to heat expansion. Another system used is an insulated joiner, i.e. a piece of plastic fastened to both sides of the rail ends and fastened to the sleeper.

At model railway tracks the following is a list of systems used with the approximate cost and degree of difficulty if you are not electrically minded:

1. Infra-red light pick-up unit then to transistor operation about $25, and very complicated, expert only,
2. CMOS logic on the two rails about $20, expert only.
3. Light Activated Switch plus transistor relay system about $15, Dick Smith sells light activated switch kits to which you add transistors. Skill level 75% of (1).
4. Relay system — this is the system proposed in this article.



The relay system is the early mainline method of controlling line movements, signals, and boom gates. You add voltage to one rail and have a negative on the other. When a train shorts across you have a connection and it pulls in a relay. This relay can control a set of normally open or normally closed contacts which gives you control of green or red light, about $4 per set of lights.

For mainline operation the green light is always on, the red light is on when there is a train in section and the green is out.

Component list for one signal

- 1 Relay SPDT 8 to 12Vdc (Dick Smith Cat P8024)
- 2 Resistors 560 ohms (smallest size)
- 2 LEDs one green, one red. 7mm or 5mm — signal lights
- 1 Fuse capsule and fuse
- 1 Connection block (4 wire)
- Wire as required 0.5mm multi-strand.

Assembly

Make up the circuit on a piece of 5mm ply and put it in a general purpose box. The relay has five pins on the bottom.

Solder extension wires to the bottom pins. The common is where the positive is wired to. The Normaly-Open/Normaly-Closed contacts and coil wires are completely separate. It is advisable to bring all the wires from the outside to a terminal strip and then add the system wires to the other side instead of direct connections. Use a low temperature solder and a small iron. If you decide to go ahead with electrics on your railway it is advisable that you purchase a Multimeter. A cheap Dick Smith unit is all that is necessary.

The system is only suitable for:

- Non-electrified rails
- Brass or nickel-silver rails (note steel rails need frequent running or cleaning as per full-size)
- This is a 12 volt logic i.e. battery or battery charger. If desired you could change the LED/resistance lights for 12 volt rear car lights but this is a 6 watt total capacity.

It is important that you solder the wire to the rails and you put the control system in a box and Silastic® seal the outside.

This is a simple one-shot control system, if desired you could add a lot of extra working with transistor control.

This system will be used on my garden railway. I will have three blocked sections running and electric turnouts — all operated by using transistors and diodes. I mounted the LEDs on wooden blocks for trials but try any other mounting to add interest to your railway to give your spectators some signals. The usual disclaimer will apply to this article but it has been trialed, and is quite satisfactory as a basic main line system.

Gardening Tips

When your plants get a bit overgrown and have to be cut back don't throw out the bits you cut off. These offcuts if of the correct material, usually old wood, can be used to grow a new plant.

A few basic steps need to be followed to get the pieces of plant material to grow. From your local plant nursery get some hormone powder, this will encourage root growth.

Make sure the plant material has at least a pair of leaf nodes somewhere along it. Cut the piece to about 100 mm long, leaving the leaf nodes. Get a container of water, say a two litre ice cream container or small bucket, and make up a weak solution of household bleach. Put you plant cuttings in the weak solution and let them soak for a while, this will kill of any fungus that may be on the plant. While you're at it put your knife in it as well.

Take a plant cutting out of the solution and note which way is up. At the opposite end to this make a diagonal cut at the very end. This will give a longer surface from which the roots can grow. Take your hormone powder and put a small amount on a jam jar lid or something similar and roll the newly cut end in it. The cutting is then stuck, cut end down, into a pot of sandy well draining potting mix. You can make you own by mixing coarse river sand, perlite and peatmoss. The sand assures good drainage and the peatmoss will help maintain soft moisture and the perlite gives bulk. You're best using a 150mm pot and put about eight cuttings around it. Use a pointed stick to make the hole for each cutting, put the cutting in and then press the soil back around it. What you need now is a hot house to put your pots in. This can be achieved using a two litre PET softdrink bottle. Cut the top off the bottle and invert it over and inside the pot and there you have it, a micro hot house. This will help maintain humidity and stop evaporation.

All you do now is wait and watch, the end of the cutting in the soil will form a callous from which the roots will grow. If you have been successful your plants won't have died and in fact will have new growth.

Once you are happy that the cuttings have started to grow you can then carefully transfer each cutting to individual pots for further growth and root development.

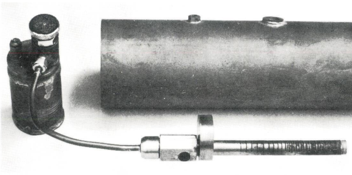
*Thanks to the **Rails in the Garden** group for the articles on this page... bmc*

A Butane Burner and Boiler

for Small Scale Locomotives and Marine Applications

by Paul Trevaskis

Drawings and photos by author



The complete burner and boiler assembly.

This is a design for a burner to run on butane gas and burn in a single flue copper boiler, mounted horizontally. It will not work vertically. The boiler measures, 50mm diameter shell, 180mm long, flue diameter of 19mm to 25mm and thus falls short of requiring certification by the statutory authorities and/or AMBSC.

The boiler and burner combination will steam a loco with cylinders up to 13mm diameter and give a run of about twenty minutes. For marine use it would steam up to about 13mm bore single cylinder engine as they tend to rev harder. After that you may have to look at double flue setup and a larger diameter boiler shell. This would also apply to the larger narrow gauge locos in gauge 1.

Positioning

The idea is for the burner to sit as low as possible and to one end of the flue. This will give the most combustion space with no tongues of flame licking out the end of the flue.

I have found that an evaporation rate of 8 ml/min will steam most locomotives. If you get it up to 16 ml/min., most of the steam is wasted in a small loco and you will have a roaring burner doubling as a flame thrower cum whistle.

Burner Body

I make the slotted tubes from stainless steel car radio aerials. Do not use chrome plated brass. It is not strong enough once all the slots are cut and is weakened further with heat. With a bit of scrounging you should be able to find an aerial the right size, around 7mm. Try for as large a diameter as possible, anything less than 6mm is too small.

The slots I cut with an *Atlas Super Saw*. They are available from most hobby shops quite cheaply and will cut slots 0.25mm wide in anything. Do not use a hacksaw. The slots are too wide which can cause the flame to burn back into the burner body. Cut the slots before cutting the tube to length. Turn up a bung from brass to be a tight fit in the tube as per the drawing. If you think it might move, a tap with a centre punch on the side of the tube will hold it.

The main body of the burner is made from 13mm hex. or round brass or bronze. Make sure the tube is a tight fit on the body. To have it fall off in operation can be upsetting.

The jets

Jets are easily obtained from your local camping store. They go by various numbers for the same sizes. This burner uses a HM jet, also known as *Primus* No. 8925.

Chances are you will not have the correct tap to make your own jet holder from scratch. So you will have to get hold of some sort of burner which uses this type of jet. Then modify the jet holder to fit this design, it may need sleeving up to 9.5mm. The HG jet gives out 8000BTU and in the setup described and will evaporate up to 12ml of water per minute. This should steam anything in the smaller scales. If it doesn't, then the problem must be elsewhere.

Tube bung

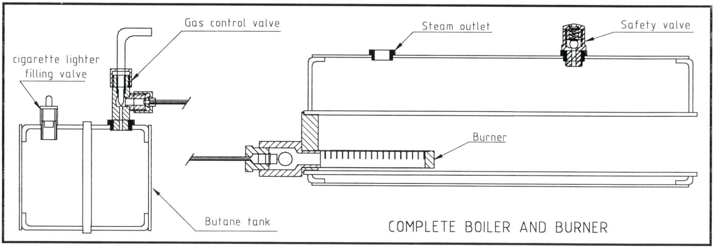
Take a piece of brass to suit your boiler flue and turn it to a firm sliding fit in the flue. Leave the shoulder to stop your burner disappearing into the boiler. Drill the hole to suit the burner tube off centre so that the burner will sit in the bottom of the flue.

Gas tanks

This type of burner is designed to use the gas as it evaporates off the surface of the liquid butane in the tank. Therefore the take off must be at the top of the tank. A tank of less than 25mm diameter will not evaporate enough gas to supply the jet. Tank shape will depend on your application. A tank 50mm diameter and 38mm high will give a run of about 20 minutes. This must be constructed properly, with flanged and stayed ends as per the boiler.

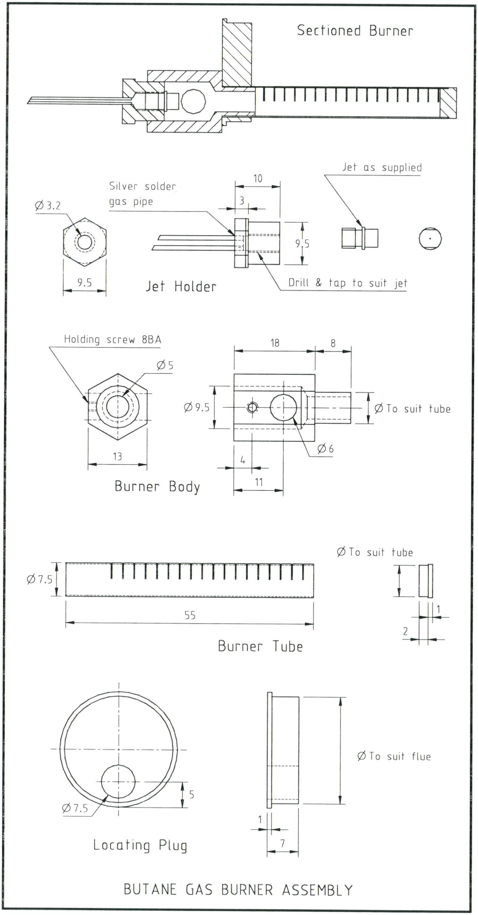
Problems

A burner made to the drawings and fitted with the recommended jet will work first time.



However, the burner will not light in the open air. They are made to function in the flue.

Most problems will stem from the jet, too big and the flame will be a greeny colour instead of the normal blue, and the exhaust gases will stink. This means there is not enough air in the mixture. If it is way too big the burner will not light properly, it will not burn down inside the tube, just cook the smoke box. Change the jet as it is not the right size even though it might be the right number. It has happened to me. If you suspect some flame licking out the flue, dimming the lights will show it up.



BUTANE GAS BURNER ASSEMBLY

Too small a jet and the you will get a neat row of blue flames along the burner which will take forever to heat anything.

If the flames are trying to burn halfway down the flue, wrap the tube in fine stainless mesh.

If the whole thing whistles, wrap the burner in mesh again or make the slotted tube a bit longer, it may be necessary to use more slots. You just want to change the harmonics to shut it up.

The burner can be fine tuned to some extent by moving the jet in the body. When the burner has the right gas mixture it will sound right. After a while you can tell how things are going just by the noise it makes.

Cold weather starts

In freezing cold weather and using straight butane the tank will not give off enough gas to feed the burner. The tank will keep icing up. This is caused by the too much gas being drawn off too quickly for the weather conditions and the size of the tank. No more gas can evaporate off the surface as the temperature has dropped with all the heat has been drawn out of the liquid gas. Grip the tank with your fingers and you will hear the flame increase as your fingers warm the tank and the pressure rises. As your fingers freeze you can see that it doesn't take much heat to keep the tank warm enough feed the burner. If you have the room and use the disposable Primus bottles you will not have these problems as the tank will easily feed the burner and last for ages compared to the half hour or so a smaller tank will do.

Mount whole thing in the water tank or mount the tank beside the boiler. The heat from the boiler will be enough to take the chill out of the tank, problem solved.

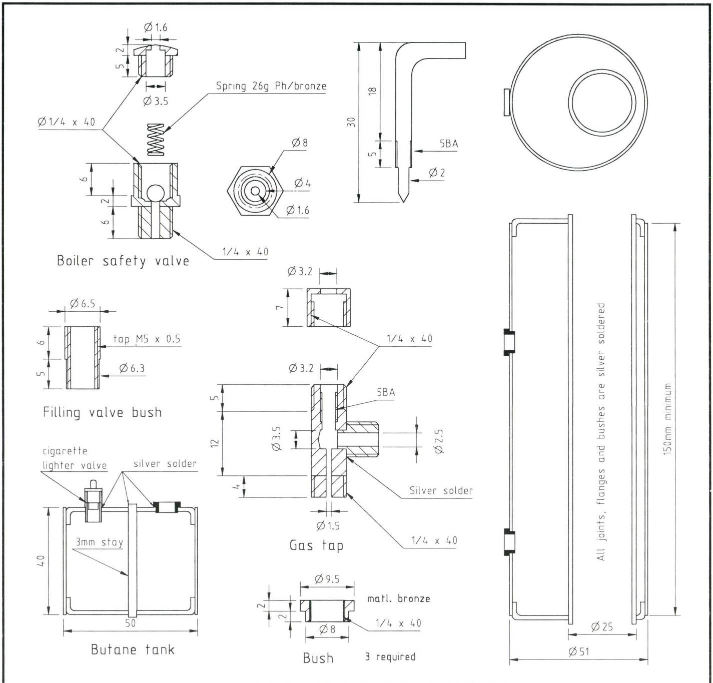
Icing up?

The icing up of tanks is not usually a problem in Australia. The use of butane with 10% propane will often help. The propane has a lower temperature at which it liquifies so will keep the pressure up in the tank. Do not use straight propane. It exerts a much higher pressure than butane and needs a different burner design.

When building tanks it is very important to remove any trace of flux from inside the finished tank. The tank must be perfectly clean otherwise any rubbish will clog the jet. Some jets come with a small piece of stainless mesh to stop this.

Filling valves

The filling valve on a butane tank must perform two functions. To let the liquid gas in and release the vapour in the tank to make room for the incoming liquid at the same time. Using cigarette lighter valves is an easy op-



BOILER AND BUTANE TANK ASSEMBLY

tion, if you take that road all that is needed is a bush tapped the right size for your valves. A common thread size is 5mm by 0.5mm pitch. If you make your own valve and it has no venting function it will be necessary to open the valve to the burner to vent the tank so as it can be filled.

Safety

Always work in well ventilated room. Any filling of tanks should be done outdoors so that the excess vapour can disperse. Burners must be turned off to refill tanks.

The gas tanks must be made properly. If made to the same standards as the boiler there will not be any problems.

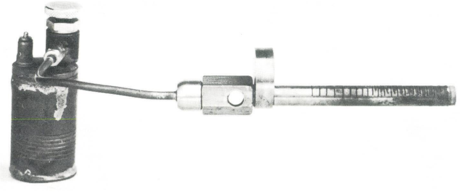
The O-rings which are used for sealing the filling valves must be checked regularly. The same applies to any glands, screwed fittings and jet holders. With the burner body removed, leaving just the tank and jet body complete, drop the whole thing into water. With the tap cracked open there should be no leaks, just a stream of bubbles from the jet.

When filling tanks care must be taken not to overfill. An overfilled tank will supply the jet with liquid gas. This will give a huge yellow flame out of the end of the flue. Gas vapour may be seen coming from the air intakes in the burner body. Butane gas is heavier than air and as it puddles under the loco or in the bottom of your boat, and if it is ignited, there will be a ball of flame which will singe everything in its path. If the burner is spluttering from an overfilled tank it will clear itself as the liquid level drops. If it is roaring with vast amounts of flame, immediately turn the supply off. Then with the boiler/burner outdoors crack the gas valve to allow the liquid to disperse. There is really no other way to remedy the situation.

Marine installations

When compared to the blowlamp type burners, this design runs a lot cooler and uses far less gas. The boiler is easier to construct than those using cross tubes. Some sort of funnel will be needed to get the exhaust gases away. Even if you extend the flue a bit and push on a 90 degree bend from the plumbers.

For filling purposes it would be advisable to make the whole tank and burner removable as one. Ensure the burner itself a tight fit in the flue. Turn a shoulder on the jet holder,



A closer view of the burner and tank assembly

making it a sliding fit into the body. That way the tank and jet will come out as one unit, leaving the burner behind and taking little movement to remove. To fire, a cigarette lighter held over the funnel as the gas is turned on will give a low pop as the burner lights.

Locomotives

Because this design does not use a blower there is no need for a closed smoke box. I have a loco with inside valves and the smoke box open at the bottom, the exhaust gases warm the steam chest and cylinders. Thus there is little water to clear from the cylinders on starting. A cigarette lighter held over the chimney lights the burner.

Gas tank and boiler construction

The boiler is a generic design and is meant to be modified to suit individual applications. Depending on where the gas tank is to be placed you may be able to make the tank and boiler from the same size tubing. If so the time spent turning up a punch and die for the end plates would be well spent. This has been covered previously in AME.

Take a length of 50mm diameter copper boiler tube 1.6mm thick. From this length cut a piece 180mm for the boiler shell. Another piece 40mm for the gas tank. For the end plates you will need four 60mm diameter circles. Make sure they are well annealed before starting to form the plates. If you are using the punch and die it does not take many hits before the plate is finished.

Two of the plates are for the tank. Drill a centre hole in each for the stay and another two holes in one for the filling valve and gas tap bushes as per the drawing. Put a light smear of flux on the edge of the end plates and bushes before assembling. Silver solder all the joints in one go using as little flux as possible. Pickle when cooled ensuring that it comes out perfectly clean. A dirty tank is sure to lead to problems with blocked jets later on.

A quick word about pickling. Some people use a dilute sulphuric acid solution. This can be dangerous if spilt and the fumes are rather noxious. If you forget about something in the solution it can disappear overnight. It has happened. Vinegar is safer as things can be left overnight, safer still to buy your own rather than raiding the kitchen.

After forming the boiler end plates bore the holes for the flue. Depending on your machinery it may be easier to drill a few holes and file the hole to size and shape. The flue should be a firm fit in the plate with no great gaps to fill with solder. With these boilers there is no need for a central stay as the flue forms the stay. The drawing shows two bushes in the boiler shell. Use bronze not brass. Please position these to suit your own application.

I have found the best order for soldering is to do the ends first with the bushes last.

Fittings

A safety valve is mandatory and it is a good idea to use a separate filling plug. The same sort of fitting can be used for both the gas tank outlet and the steam throttle. The gas tap is drawn with a bent handle. This has been done so you will know at a glance if the gas is turned on or off and by how much. While not completely necessary a water gauge is well worth the effort. With this burner the boiler can run dry and not cause any damage. It does not have enough heat to melt the solder. Even so the fire should be killed as soon as steam runs dry. It is too easy when talking to forget just how long the engine has been running.

Variations

In this small size you can try all sorts of arrangements quickly due to its simplicity. For example the flue can be placed off centre to make fitting a water gauge easier. There has been a lot of work done over the years by people in the smaller locomotive scales on burners and boilers of this size. Anything and everything has been tried.

This design is the product of many years of development and the result is a safe and reliable steamer. It has proved itself in my own locomotives, with countless runs at public exhibitions with the *Rails in the Garden* group and on my own track. The basic design is used by commercial locomotive builders with great success. The only problem has been a clogged jet every year or so.

If you have any problems I welcome correspondence through the editor of this magazine.

Australian Model Engineering

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AUSTRALIA.

Traction Engines — an Alternative Boiler Mounting

Bob Henderson describes an idea which removes the shock loadings associated in mounting the chassis to the boiler

Drawing for publication by Neil Graham, photos by the author

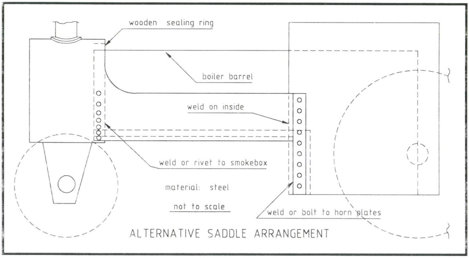
This is an idea that occurred to me while I was building my Cliff & Bunting traction engine. It could be adopted on any traction or other road type of engines that do not have the benefit of a frame to support the boiler as happens with a locomotive.

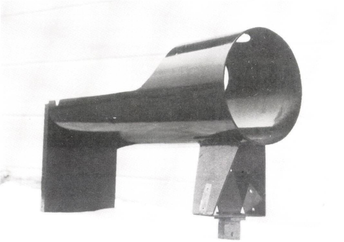
In the latest AMBSC copper code, there is a section that specifies an increase of thickness of the barrel to cover shock loads that the traction engine boiler receives while in motion.

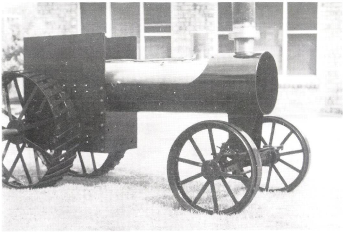
My suggestion is that a steel half cylindrical section be securely attached from the smoke box (or where the front wheels are attached) to a throat plate which is then securely attached to the horn plates. This allows the boiler barrel to be virtually free of the stresses from motion on the road.

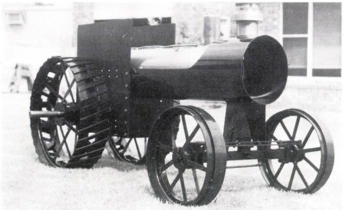
When staying the firebox I made special stays for two logitudinal rows on each side. 12mm square copper bars were attached to the stays, these bars fit four 12mm steel bars rivetted to the throat plate. This allows the boiler to be removed from the sheathing by undoing the bolts on the throatplate. The boiler is extracted towards the front. At the front end of the boiler I made a wooden sealing ring to hold back the lagging — this has not burnt after a couple of years of use.

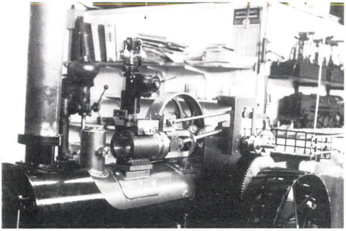
Sheathing of the barrel will not alter the lines of the engine. I am very satisfied with the results.


wooden sealing ring
boiler barrel
weld on inside
weld or rivet to smokebox
material: steel
not to scale
weld or bolt to horn plates
ALTERNATIVE SADDLE ARRANGEMENT









A New Melbourne Model Park!

Model makers of all kinds are soon to be treated to the most exiting development in Melbourne in twenty one years.

Tullamarine Live Steam Society have acquired a most splendid new location, 5km. North-West of the current but soon to be vacated well known Springbank street site.

Bulla Hill Railway is the name of the new centre of activity for the Tullamarine Live Steam Society. An easy 25km from Melbourne GPO. Major earth works for levelling, grading and filling have just commenced. Careful choice of this prime semi-rural region was made 12 months earlier by club committee and 75 member consensus — opting for easy vehicle access and parking, views of Mt. Macedon ranges overlooking Deep Creek, and 5 hectares (12.4 acres) with grand potential!

The existing track will be transported in sections to its new home, then re-shaped to an improved format, reducing the number of turnouts from the previous eighteen to nine. Ruling grades are to be one-in-one-hundred, with occasional one-in-eighty, ground level, super elevated and fully ballasted.

A delightful separate line of 3½" and 5" gauge of 850m will run parallel with the 1.4km 7¼" gauge track both having two bridges and varied landscaped cuttings interspersed with 500 trees and shrubs.

Boating enthusiasts are welcomed to the twin ponds of 12 metres and 20 metre diameters, joined by a 4 metre by 15 metre canal way.

Traction engine owners are to be made welcome with wide lawned areas and scoria levelled trackways set amid picnic places and shade trees.

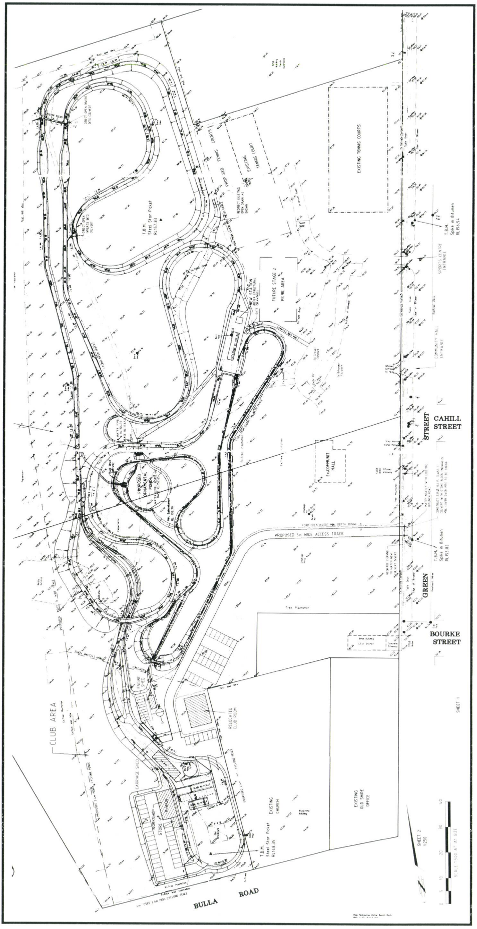
Trackside

Full two-aspect signalling developed by senior member Alf Harder will control safety operations. Members will continue to enjoy large club room conditions and facilities, with the re-location of well-served former building, workshops, engine shed, carriage sheds.

With much hard work needed for successfully completing an enterprise such as this (over 4 years) the pioneering spirit and efforts of present and past members of Tullamarine Live Steam Society members is fondly remembered.

The new Bulla Hill Railway is a tribute to their hopes, planning and quality of workmanship. With guidance of President Andy Mitchell, future hopes of constructing a tunnel, foot-bridge, and further landscape improvements, will make this venue a fine Melbourne asset, indeed the model engineers haven.

Enquiries are welcomed. Please contact: David Gregory, Phone (03) 9337 9836.



Applying Stick with Adhesives

From the Brisbane Maritime Modellers magazine *Parvus Naupegus*

The historical background

It is of some interest to note that all modern techniques with timber and its adhesives had a maritime origin. In the early days of seaplanes and flying boats it was discovered that traditional construction of Edwardian lightweight skiffs and dinghies was dangerously useless even at modest floatplane taxiing speed of the day. So the Royal Navy, in 1915, started the first scientific investigation of timber strengths and joints.

All subsequent research into timber strengths, throughout the world, has been essentially based on what the Royal Navy initiated. The opposition, in Germany, followed suit being engaged on building timber aircraft 198 metres (650 feet) long with 5 heavy engines. These were the Schutte-Lanz airships, about 20 of which saw service in WW1. They were built like a giant spider web of skinny wooden lattice work and very thin plywood. Information about them can be found in almost any free library.

The new boys on the block, the aircraft engineers who didn't exist before 1903, rapidly prohibited all the traditional timber joints. No more mortise and tenons, dovetails, half laps, stepped splices and all the other structural pipe-dreams which had deluded the traditionalists for centuries. A but joint with a scientifically designed plywood gusset on each side was safer, lighter and importantly of predictable strength IF the gluing was reliable. So everybody was stuck, to coin a phrase, with the problems of adhesives and the traditional fish, animal hoof and vegetable glues didn't show up too well. They opted for casein glue, which wasn't exactly new because the ancient Egyptians had used casein for furniture nearly 5000 years earlier.

Naturally we don't have to delve too far into this sort of background just to stick model boats together, particularly static models which don't have to go in the water or bump into one another if the radio frequencies get glitched. However on the general subject of adhesives, four points may beneficially be borne in mind:

1. A fair amount of what people say about adhesives may be suspect. What matters is what is written about them, notably by their manufacturers.

2. Very few of the sometimes well-advertised (and relatively expensive) products displayed in the hardware stores or supermarkets will actually preform as anticipated in the long term service.

3. Once in a while we may wish to use glues for some other purpose at least as technically demanding as in model boats.

4. The range of industrial adhesives is enormous and, within any specific chemical grouping, there can be up to hundreds of different formulations to suit varying industrial application needs.

Obsolescent adhesives

In this group fall all the traditional glues, of fish, animal or vegetable origin. Including casein glue which for 40 years was in worldwide use on wooden aircraft. Except with special protection and vigilant routine inspection, all traditional glues were susceptible to moisture, exposure to light, and bacterial or fungus attack. All have been replaced with better modern products.

Cellulose glues

This group includes the well-known balsa cements and, partially related, the polystyrene or similar cements used on most plastic models. Their joint strength may markedly decrease with age . Provided a slower drying time is acceptable the ordinary white PVA glue is much better , and reports of tests by USA modelers confirm that aliphatic PVA glue is the best adhesive for balsa.

PVA glues

Are by definition, based on co-polymer polyvinyl acetate resins. These are the familiar white glues and are probably the most widely used adhesives in the furniture and allied trades, for which they are supplied in a variety of formulations for specialized applications.

Structurally they are not very good adhesives, being sensitive to the moisture content of timber and are far from waterproof. They cause swelling of joints and are unsuitable for large areas, such as veneering, where they cause warping or blistering. The glue line is hard to sand and can re-act with some paints. Depending on the formulation they can be unstuck by the application of quite modest heat, including direct solar radiation.

Aliphatic glues

These are sold under various titles such as "Sanding PVA" or "Aliphatic PVA". They are more expensive than ordinary PVA but are significantly superior. The expense may be illusory as this glue, like zinc chromate primer in the painting process, gives the strongest bond with the thinnest possible film thickness. Aliphatic resin glues comply with a USA "Mil. Spec" a military specification requirement. They are waterproof. The translucent glueline can be sanded and is unaffected by paints or lacquers. No warping problems affect larger areas like veneers. Small metal parts like handrail joints, provided they are clean and degreased with methylated spirits, can give good service with a tiny dab of this glue. (Aliphatic comes from the Greek word for fat or oil. The chemical relationship is to fatty acids and the groups of hydrocarbons known as alkanes, alkenes and alkynes. Actually all we need to know about any glue is that it is unlikely to give satisfactory results unless the manufacturers' information is carefully studied).

Contact cements

Also known as impact adhesives. The stuff that smells like old fashioned tyre repair solution. Selley's "Quickgrip" being a representative example. They are usually neoprene and toluene based and the gluelines resist sanding. Despite their "rubber" content they are not waterproof, and unless one or two contacting surfaces is extremely rigid these cements will produce severe warping. They are not adhesives in the structural sense. Their main purpose is industrial where with suitable machinery, their ability to give an instant stick helps to speed production.

Urea-formaldehyde and Phenol-formaldehyde glues

These are two-part adhesives of which one part is a liquid acidic hardener which is applied by brush to one of the two surfaces to be joined. They were the first of the synthetic glues to be widely used. They also have problems and their use on wooden aircraft and propellers has been prohibited in Australia since 1961. Strength deterioration with age can be a problem, with lack of technical understanding about the actual nature of timbers and gluing being contributory factors.

There are one-shot glues in this category, where the acid component is embodied as a crystal in the glue powder and does not become active until mixed with water. "Cascamite" is one example. Also prohibited on aircraft in Australia. With most modern glues it is extremely important to observe the "Use by date" when this is quoted, and which is extremely short in time margin with some glues and/or their catalysts.

Epoxy glues

This group, today, probably embraces well over a hundred different formulations for widely different purposes. Concern has recently arisen in the USA on amateur built aircraft after a period in service. Some epoxy glues have become soft and pliable. Other epoxy glues have done the exact opposite, become brittle and snapped like glass. Not surprisingly there is a long-established American saying that aircraft engineering is just ordinary engineering made a dammed sight more difficult. For model purposes it can be assumed that the "5 minute epoxies" are a good deal weaker than the slower curing varieties. Epoxy glues, in general, are not so good at resisting shock loads as is popularly believed.

Because epoxies are frequently used in fibreglass components it is desirable that advise be obtained on the best epoxy glue to use for repairs. Almost all groups of adhesive are incompatible with one another, and this can also apply within a single group like the epoxies. Some fibreglass structures, together with those embodying Kevlar or carbon fibre, also use polyester or vinylester resins and require corresponding selections of adhesives in the event of repairs.

Resorcinol glues

Currently the best of the timber glues for critical structures and is preferred for wooden aircraft. Because it shows a dark purple glueline it is not favoured for furniture or similar purposes. Resorcinol should not be used at temperatures below 21℃ (70°F) because joint strength is degraded, and it is very important that any timbers to be glued attain this minimum workshop temperature before glue is spread. These glues also require relatively high uniform clamping pressure which must be maintained for at least the minimum curing time.

Cyanoacrylate glues

These are the much advertised "Super glues". They were developed about 40 years ago as a possible replacement for stitches in surgery, but were found to have adverse side affects. That is why they will stick your fingers together. They work on a two-part principle, but the second part is water vapour present in the air which, on contact with a chemical in the liquid glue forms an acid which hardens the glue. In consequence any air which gets into the tiny bottle after it is first opened introduces invisible molecules of water vapour, initiating a slow cure, and what is left in the bottle may become an increasingly ineffective adhesive. These glues are actually not very good glues as they have a low peel strength. However providing their film thickness is small, preferably a microscopic one molecule, they will develop very high strength in shear. They should be stored away from light and at domestic fridge temperature, but they must obtain room temperature before use. There are many formulations for these glues. Loctite market about six different types which are approved for use on aero engines. Loctite also supply a large selection wall chart in colour, because the most depressing and expensive things can happen to any engine if an incorrect type of loctite is used in the wrong place.

Additional observations

The foregoing notes briefly deal with adhesives for timber. Plastic and metal bonding are a somewhat different and more complex subject. It is extremely important that manufactures' information is carefully studied. A number of the modern materials are irritant or toxic. Even the Safe-T-Poxy imported from the USA is not entirely safe, as some people working with fibreglass have discovered to their intense discomfort.

Flat Bottom Clamps

by Bob Kimber

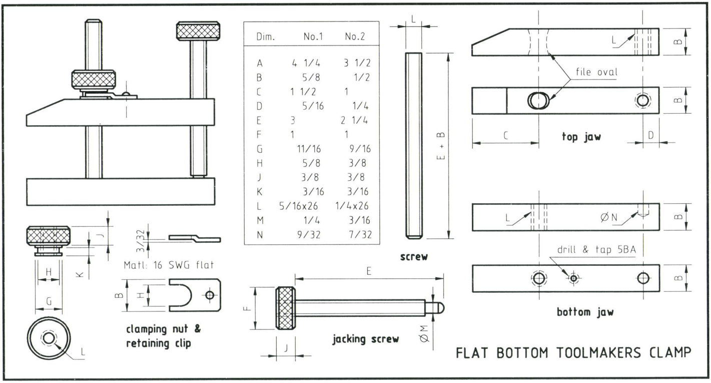
The standard toolmaker's clamps, while serving a useful purpose, do not lend themselves well for through-drilling, mainly because they can't sit flat on anything! The subject of the drawing below has the advantage of being able to sit flat on the drill table.

I made my first pair to the No.2 size more than thirty years ago (I don't know the origin of the design) and they have given good service. However, I have often felt the need for a deeper throat, so I made a pair to the No.1 size. I really don't know why I put it off for so long as the pair were made in less than four hours!

The dimensions are not really critical, although I suggest the use of finer threads offers better clamping power. I used Loctite® to secure the stationary screw to the base member. I also used the same liquid to fix the knob to the jacking screw.

The knob and clamping nut were made of brass and were medium-knurled for grip. All other parts were made from steel.

In use, the screws at the lengths shown, may in some situations foul the drill chuck when working up close. The clamping screw could be reduced in length if this was found to be a disadvantage.

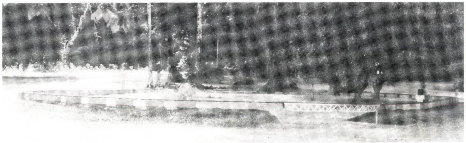


Dim.	No.1	No.2
A	4 1/4	3 1/2
B	5/8	1/2
C	1 1/2	1
D	5/16	1/4
E	3	2 1/4
F	1	1
G	11/16	9/16
H	5/8	3/8
J	3/8	3/8
K	3/16	3/16
L	5/16x26	1/4x26
M	1/4	3/16
N	9/32	7/32

FLAT BOTTOM TOOLMAKERS CLAMP

A Track Problem Solved

by Peter Lukey



A view of the completed track circuit.

Three years ago I decided to build a small railway in the backyard. The main purpose of this railway was to provide a convenient location for testing new locomotives and rolling stock without travelling the long distances necessary in far north Queensland to get to the nearest private or club track.

Two other advantages of having your own track are:

- proximity to your own tools if adjustments or repairs are required and,
- ability to fail in your endeavours without the embarrassment of doing so in front of others

Design considerations

Several considerations defined the scope of this project and its design.

The first was the space available, which was bounded by the house, two fence lines, and domestic car access. This required the track to fit into a space of 16 metres by 24 metres. Going around the house would have been ideal, but lack of funds and the large amount of earthworks required ruled this idea out.

A minimum radius of 6 metres was set. I decided to install both 3½" and 5" gauges with the possibility of adding a 2½" gauge rail at a later date.

My choice of such a tight radius for 5" gauge was due to the space limitations and my personal preference for modelling the earlier canefield and QGR locomotives.

The 3½" gauge rail was included, as my wife has a partly built *Juliet*, and I have a 27 year old, 3½" gauge passenger trolley to LBSC design which is very stable to ride.

Another consideration was passenger comfort, particularly the author's. Having sustained a work related back injury at the beginning of the project, a raised track was essential. This was mounted on a row of standard cement blocks, set at one block spacing. The blocks are ballasted with crusher dust to about ⅓ of their depth. This sets the railhead about 6" above the ballast.

Construction begins

Earthworks were used to set the gradients along the track which included quite a lot of fill in the form of an embankment and some excavation work. A water drainage section of reasonable size had to be left in the embankment which effectively provided an excuse for a bridge.

My wife and I laid out the gradients with a surveyors' automatic level to provide interesting and practical operation and although the track circuit is only about 60 metres, a number of features were built into it.

On leaving the station, (imaginary at present), the track rises so that steam locomotives should bark a bit and impress the passengers. A run downhill to the bridge follows, allowing the driver to pump water and recover the fire. From the bridge the track rises slowly to pull the fire up, and finally a sharper rise is provided into the station to assist in braking if necessary.

Choosing the track

Consideration was also given to the look and design of the track structure. I decided to use 20 mm x 10 mm steel flat bar set on edge for the rails. The sleepers are 25 mm x 6 mm steel flat bar welded to the rails at 200 mm spacing. The decision to use rails of only 20 mm depth was based solely on reasons of appearance. I had previously built a similar railway in 5" gauge using 1¼" x ¼" steel flat bar at ground level. This worked well as the track was ballasted with 20 mm screenings, however where the ballast thinned out it did not look right. Neither was the ¼" railhead satisfactory for 5" gauge.

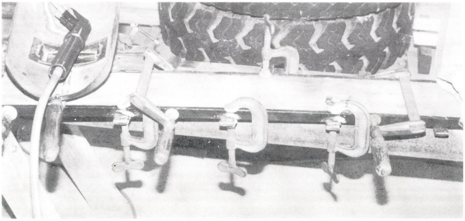
The sleeper and cement block spacings were determined by the edgewise beam strength of the three 20 mm x 10 mm steel rails; the final unsupported length being 600 mm with unnoticeable deflection. The load estimate was based on a 4-axle trolley with bogie centres at 900 mm, ridden by three average adults.

Welding the rail

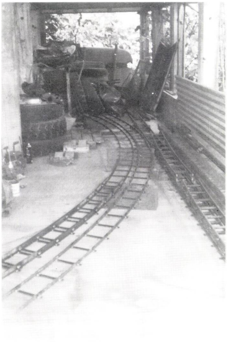
The choice of rail section and the method of construction led to a somewhat distressing problem in the form of welding distortion.

The sections of track were welded up in three stages:

- Firstly, the outer rail, 6 metres long, was



The welding set-up showing the curved ply template.



The completed track sections.

welded to the sleepers at 200 mm intervals on a spacer jig.

- Secondly, the inner rail was welded to the sleepers, pulling the outer rail around a 20 mm thick plywood template 1.5 metres long. Two templates were used. One for 6 metres and one for 7 metre radius.
- Finally, the 3½" gauge rail was welded, using gauge spacers. The straight rail sections were also welded using gauge spacers.

This method of construction, of course, ended up distorting the track sections, but to what appeared to be a manageable displacement.

The problem

However, after installing the track sections on site, I had an outward camber on the curved sections of over 20 mm and no amount of body weight would hold this camber down! So a plan was devised to pull the inner rail down with custom made tent pegs.

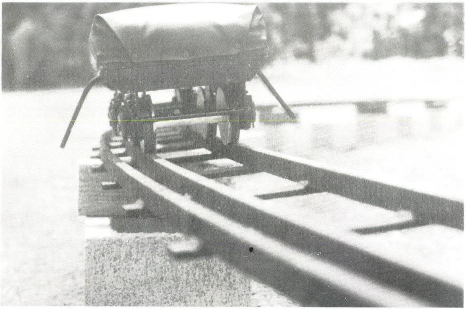
Good idea; but on testing, the pegs just pulled right out of the ground! The track sections were in fact distorted into a cone plane and had even pulled up the straight sections that they were welded to.

No doubt many readers are chuckling at my ignorance in building welded steel track, and I don't blame them since this was my second attempt.

The solution

The solution needed was to combat the distortion problem by reversing the stress in the inner rail. I hurriedly refurbished my old passenger trolley to use as a portable seat to enable me to effortlessly negotiate the new track.

I ran 75 mm of weld along the top of the inner rail, over each sleeper, and then ground it off afterwards. The weld pulled the track down to the inward camber of the cement blocks which I had set with a builders level. The inner rail actually moved down as much as 25 mm!



The problem camber is clearly shown.

The author welding the rail head to releive the camber.

Having pre-painted the track, I now had to repaint the burnt areas.

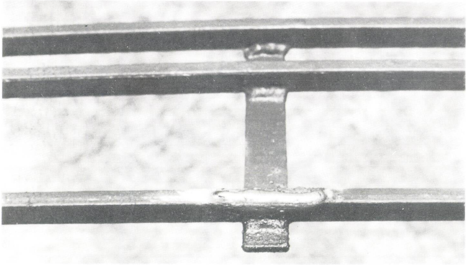
The track was built using CIG *Handyman* welder, a 100 mm angle grinder, and 125 mm and 350 mm cut-off saws for cutting the rail ends and sleepers.

The earthworks were done, by Arthur Ambrum, in his own time. His endeavours are gratefully appreciated. In all, he must have shifted about 10 cubic metres of fill with a Bobcat. Approximately four cubic metres of crusher dust was used as ballast to stabilise the cement blocks and I expect to use another two cubic metres in the station area.

Conclusion

I am currently building a run-off ramp to sidings for a steaming bay. The main track of this will also continue under the house (a typical Queenslander — on stilts), as a loco shed.

This article is written so that it may help others who have similar camber problems with their own curved tracks, though hopefully not as severe as the one outlined.

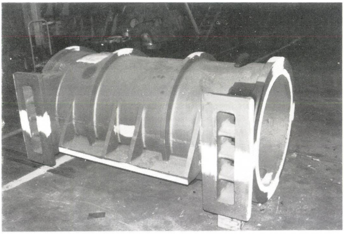


The camber solution — a weld bead along the "high" rail head above each sleeper.

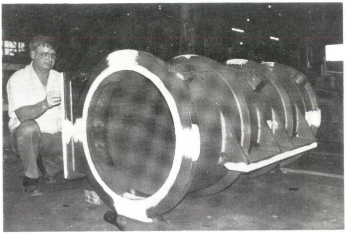
A New Cylinder at the Mill

story and photos by Peter Olds

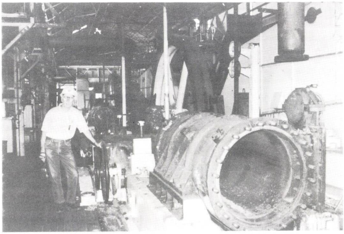
Last year we were pleased to have Dave Harper pay a visit to Maryborough and gather material for *Maryborough Odyssey* (AME Issue 63). During his visit the sugar crushing was in progress and I was able to take him to the Maryborough Sugar Mill, mainly to see one of the few remaining crushing engines working. These have in the main been replaced by turbines which are not nearly as interesting to see and are likely to send you deaf if you stand near them for long.



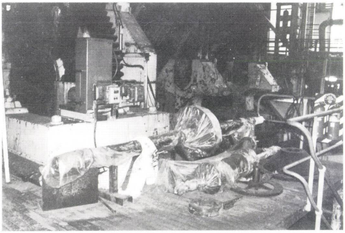
The replacement cylinder casting for No.3 Walkers-built steam engine at Millaquin Mill — November 1995!



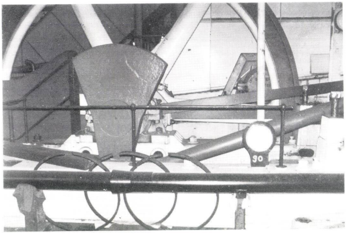
Peter Stafford, the foundry manager, crouches beside a port face of the 30" bore x 54" stroke cylinder casting.



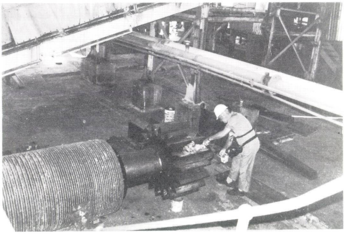
Dismantled No.3 engine and original cylinder casting. The piston valve chest has been removed while waiting the arrival of the new cylinder.



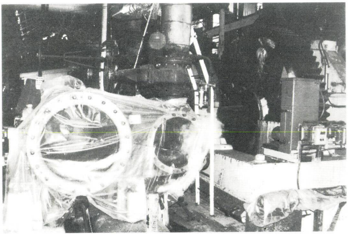
No.3 engine piston and 6" diameter x 14ft 10in rod assembly covered in protective plastic. The piston valve, also covered, is just in front of it. Note the large ring spanner on the floor (lower centre).



The flywheel and crank with the connecting rod still attached. Note the three piston rings leaning against the bed. A new piston rod is in the foreground.



Just one of the many rollers in the mill still powered by steam engines. The man in the photo gives you an idea how big these things are!



No.2 engine — cylinder and piston valves opened up for maintanence and protected by plastic sheeting.

Late last year I heard that Walkers Ltd of Maryborough were costing a new cylinder for one of their engines working in Bundaberg at the Millaquin Mill and Refinery. We have a fairly close association with Walkers through our business and I am often in their works. On one of my visits armed with camera I was able to get a few shots of the new casting. I had to go to Millaquin regarding some work we were doing for them and remembered the camera just in case I could get near their engines and the one in question was still dismantled. Millaquin Mill still uses two Walkers engines and one built by the Bundaberg foundry.

There must be at least one Walkers crushing engine still working in NSW, during 1994 we cast and machined a new big end bearing for an engine at Harwood Mill.

Our thanks to Peter for bringing this to our attention. It is good to see steam power alive and kicking outside of museum activities. It also gives the stationary engine builder some idea of prototype action without reverting to history books! ... bmc

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Making Nuts and Tails

by Alex Russell

Most locos require some 24 to 36 nuts and tails whether they are 3½", 5" or 7¼" gauge and I am sure most builders find it easier to purchase these fiddly items rather than make them. so I feel in doing so we pass up another opportunity to really familiarise ourselves with the use of our lathes for which we have paid out a large amount of money to own without maximum useage. At one time these items had to be purchased overseas and it often took up to six months before they arrived, so I have become accustomed to making my own.

Nuts

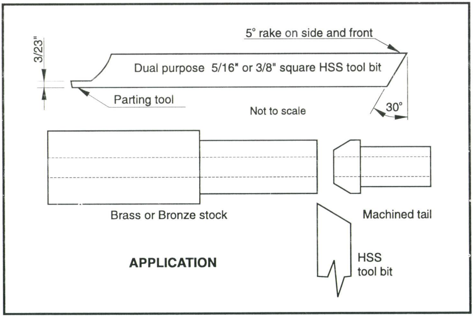
Say you are to use 3/16" tube on a new]oco, to start on the nuts you will need, a centre drill a 7/32" drill. A 9/32" drill and a 5/16" x 32 tpi. intermediate tap. and a narrow parting tool about 3/32" wide.

The cutting point of this tool needs no top rake, the front clearance no more than 5 degrees and about the same amount of clearance on both sides. and the cutting point need not be longer than ¼" but only use it on brass or bronzes.

Last but not least, it helps greatly if you have several Jacob type chucks so that you don't have to keep changing drills. I have several drill chucks saved from various sources, mounted on several morse taper shanks made on my lathe and I'll describe how to make these useful items in a separate article.

Make a start on the nuts by putting a piece of 3/8" hex. brass sticking out of the 3 jaw say, two inches. Face off the end, centre drill, follow up with the 7/32" drill and go in 1" or more. Next use the 9/32" tapping drill to 9/32" depth. Mark this distance on the drill with a felt pen and do not exceed it. Next with the lathe running push the tap up hard to the drilled hole and when it takes up switch off the lathe sharply.

After backing out the tap, part off to a full 3/8" long. Before you fully part off round off the corners with a 10" second cut file. Make sure your files have handles. I saw a Turner, who should have known better, get a file tang right through the palm of his hand at work... not a pretty sight I can tell you.



Now follow this proceedure in making the nuts until you have the required number made. Next comes the tails, the simple and easy part of the job, all done with two drills plus a specially shaped cutting tool that makes this normally tedious job a real pleasure.

Tails

For these items mount a length of 5/16" brass rod in the 3-jaw chuck, sticking out land ½", face off the end, centre drill and then go in with a 5/32" drill one inch, or more, follow up with a 3/16" drill a full ¼" depth, mashing this distance on the drill with a felt pen. Next using a nut you have just made as a gauge, turn down an inch or so with the point of this special tool so that the threaded portion of the nut fits closely over same (as far as it will go). Mark this position with the felt pen on the cross slide index so that you can go back to this diameter each time.

After doing this and with the same tool turn down this pre-machined. portion so the the 7/32" hole in the nut fits closely along ¼" of the embryo tail. Mark this diameter also on the cross slide index. That done at 3/16" past this shoulder you have made, plunge the point of the tool into the work and by so doing you will part the tail off and at the same time form the 30 degree angle of the tail nose all in one simple operation.

In the process of parting off push a smaller drill or a piece of stiff wire partway up the bore in case the piece drops into the tray swarf and you have difficulty finding it.

One other small point: Don't have the cutting point of any tool too sharp on brass or you will get a scratchy finish. Dull the point a little with an oilstone slip.

Birth of a New Bridge at Bankstown

by Scott Robertson

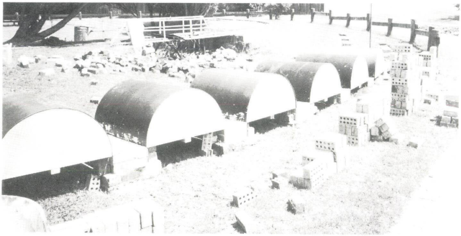
Our society has been planning an extensive 5" g track renewal and expansion project for some three years, and that its finished I'd like to tell you about it.

The scope of work was to renew most of the existing trackwork including 15 brand new points, and extend the track length from 300 metres to 780 metres, also adding more grades. We have managed to keep the tightest radius of one curve to 13.1 metres, the rest are 13.7 metres, 15.2 metres and the curve on the new viaduct at 16.2 metres.

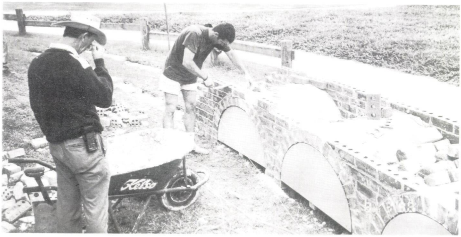
The first job to be done on the project was to build out and reinforce the embankment along the stormwater canal which boarders our park. We accomplished this by building a 1 metre thick brick wall some 3 metres high from the top of the canal, to our park ground level, using 6 truck loads of brick demolition rubble that we acquired. This wall is about 20 metres long, it was quite a job in itself! Building this retaining wall gave us enough room to run a new 5" gauge route past the existing elevated track, at what is know as *Parachute Corner*, (in the old days when running the small 2½" and 3½" gauge engines around this curve the ground dropped away straight down to the canal, about three metres — hence the name — you would need a parachute if you came off the track!)

A somewhat safer Parachute Corner as it is today.

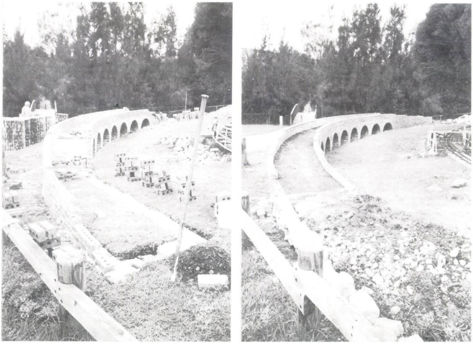
The next phase of the project was how the new outer curve at the North end of the park was going to traverse a deep dip in the topography. Ideas were plenty, finally the decision was made to build a brick bridge to use up more of the bricks that we acquired. After much planning the result is an eight arch brick viaduct 18.3 metres long on a 16.2 metre curve. On the outside of the curve it stands 1.5 metres from the ground at its highest point. The members set to and built the curved/tapered arch formers to support the



Stage 1 — formwork for the brick arches.



Stage 2 —laying the bricks.



The bridge takes on its final shape.

brickwork, the footings were dug and layed, using more of the brick rubble.

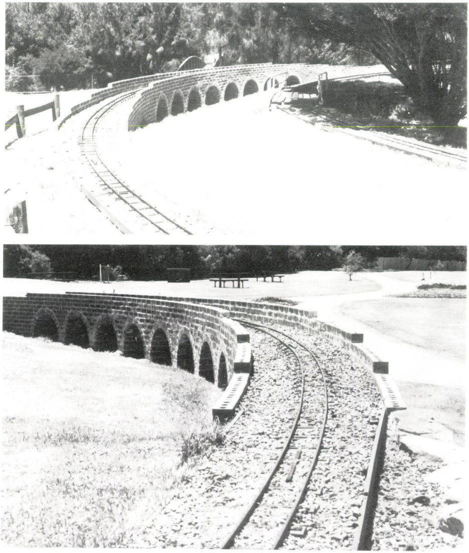
We decided that building the bridge was beyond our mug bricklaying talents, so a friendly brickie was employed, a brick saw had to be hired to cut each brick to shape and size to fill in between the arches, in all there was a week and a half to dig and prepare the footings, and six days straight for the bricklaying, employing five men.

The next job, was to use up more of the sandstone that we found concealed in the five or so truck loads of fill. It was used to great effect to dress up our 8.5 metre long tunnel with stone entry wings funnelling the track into the portal opening and to make the landfill over it look more like a hill! It was also used to line the cutting on the outlet, or western end, of the tunnel — it all looks rather splendid!

Track making and installing the timber edging to confine the 26 tonnes of ballast continued.

The track was made using 20mm x 10mm black bar, with 25mm x 3mm steel ties welded to the rail to maintain gauge screwed to 50mm x 30mm tallow wood sleepers at 200mm centres. The new turnouts are all based on NSWGR prototype and have 13.7 metres radius. They are operated by weighted levers for driver operation. we are also in the planning stage of installing lower quadrant signals to be controlled by the point levers. I think the older style signals will give an old-world feel about the park, the signals will be removable for storage.

Well, fellow Live Steamers, I hope I have wet your whistles (so to speak) to come and and visit us and maybe run your locomotive.

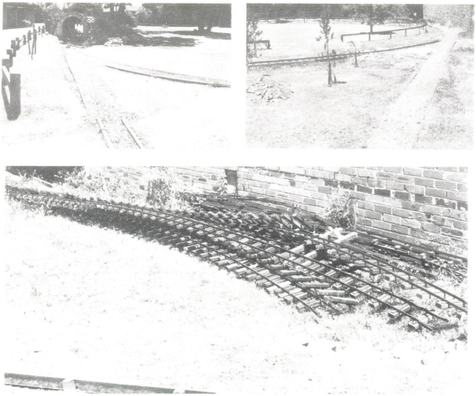


These two photos show a driver's view of the bridge from both ends.

A major setback!

This story has an unfortunate postscript. Just after Christmas 1996 a few members received a call to the track. On arrival they found about 80 metres of the new track ripped up by vandals. The members repaired the damage and went home disappointed at the damage, but happy they can use the track again. The next day another call to the track — this time about 160 metres of track was damaged or ruined beyond repair. Other damage, including bricks knocked off the new bridge, also occurred around the site.

This was too much! The members tidied up what they could and left it to another day. This time the damage was outside their resources. A report in the local paper helped, but wasn't quite enough. The members have since received offers of material and finance to help rebuild the track to vandal-resistant standards. Many thanks to all who have offered assistance, but more is needed. If you would like to help them please contact the Secretary, BSLS Co-op Ltd. PO Box 24, North Revesby, NSW, 2212.



Photos on the right showing a small portion of the damage caused by vandals.

Steam Turbine (Mechanically Driven) Locomotives

by Jim Tennant

Steam locomotive modellers may be interested in what is possibly one of the obscure railway subjects. Below is a table of all examples ever built. The alpha coding in the wheel arrangements is to identify the driven axle.

If the steam locomotive is returned to commercial viability would this type of steam locomotive propulsion system be considered as an option or the norm?

There is however one issue to be considered that places a limit on the effectiveness of using steam turbines for railway motive power.

- Steam turbines are single speed machines. Consequently, the successful examples listed below, T.J.O.J. NOHAB 1'D Nos 71-73, L.M.S. 2'C1' Crewe No 6202, and the Pennsylvanian Baldwin 3'D3' No 6200 were utilized on relatively flat profile track where the speed could be maintained to match the maximum power production of the turbine.

There is an advantage over reciprocating machinery.

- As the steam turbine produces no power pulses like a reciprocating propulsion system it does produce smooth torque and this is obviously an advantage for locomotive and track performance.

The first example that was built, in Italy during 1907, lasted in continuous service until about 1960. Also one of the T.J.O.P. 2-8-0 is preserved and is used on special trains. The other successful examples were not condenser locomotives so I wonder if condensing problems ruined the whole project and it was not a problem with the turbine systems.

Is has also been suggested that a multi stage steam turbine may be more flexible in railway use. Possibly a good hypothesis to test at the modelling level.

Some reference sources on these locomotives are:

1 Wolfgang Stoffels (1978) Lokomotivbau und Dampftecknik Verlag Basel Stuttgart Germany.

2 Model Engineer Nexus UK.

Pierre Bender - An interesting series on the construction of live steam model turbine locomotives -

Part 1 pp520-521 4 May 1990
Part 2 pp659-661 1 June 1990
Part 3 pp48-49 6 July 1990
Part 4 pp152-153 3 August 1990
Part 5 pp276-278 2 September 1990
Part 6 pp414-415 5 October 1990

3Harrison H.H., (1978) Model Steam Turbines Argus .K.

4 Fryer C., (1990) Experiments With Steam PSL U.K.

5 Tufnell R., (1985) Prototype Locomotives David and Charles UK.

Steam Turbine (mechanically Driven) Locomotives

Year	Railway	Wheel Arrangement	Construction Data	"class, Running No's"	Particulars, etc.
1907	(Italy)	AA	Office Meccaniche Miani-Silvesti-Grodon-Comi C/N -	? (1)	Individual axle drive
1921	S.B.B.	2'C	Schweiz.Lok und Maschinenfabrik C/N 2796	B3/4 1801	Zoelly Condenser (Sold Escher-Wyss 1924)
1921	(Sweden)	2'3'+C1'	Aktiebolaget Ljungstrom Angturbin C/N 1	5-C1	Condenser
1924	(London Midland & Scottish)	2(2'B)	North British C/N ?	23141	Ex-'Reid-McLeod Steam Turbine Locomotive'. Condenser
1924	Deutsche Reischbahn	2'C1'	Fried Krupp C/N 592	T18 1001	Krupp-Zoelly Condenser
1926	London Midland & Scottish	2'3'+C2'	Beyer-Peacock C/N 6223	? (1)	Condenser. Ljungstrom Turbine.
1926	Deutsche Reischbahn	2'C1'	J A Maffei C/N 5620	T18 1002	Condenser. Ljungstrom Turbine.
1927	(Sweden)	2'3'+C2'	NOHAB - Aktiebolaget Ljungstrom Angturbin C/N 1730	5-C2 SJ 1474 Type A	Condenser. Ljungstrom Turbine.
1927	FCdE (Argentina)	2'3'+D1'	NOHAB - Aktiebolaget Ljungstrom Angturbin C/N 1731	5-D1	(1000 mm). Condenser.
1928	Deutsche Reischbahn	2'C+1'B2'	Henschel C/N 20444	T38 3255	Condenser. (Ex-Prussian P8 Henschel C/N 20444) Turbine drive on tender only.
1930	Oxelosund-Flen-Westmanlands	1'D	NOHAB - Nydqvist & Holm C/Ns 1872	M3t 71	Ljungstrom Turbine. (T.G.O.J.)
1931	(Italy)	1'D1'	Breda C/N 2276 ? 2277 ?	? (1)	Condenser
1932	F.S.	1'C1'	Schwartzkopf C/N 3996/1908	GR 685.410	[(Ex-FS 685.110)1928] Rebuilt FS Florence Works (Model: Rivarossi 'HO' No 1154)
1935	London Midland & Scottish	2'C1'	Lot 100. Crewe C/N -	6202	'Turbomotive'. Metro-Vickers Turbine. 1952 (Model: Keyser 'OO' L41)
1936	Oxelosund-Flen-Westmanlands	1'D	NOHAB - Nydqvist & Holm C/Ns 2000-2001	M3t 72-73	Preserved. Ljungstrom Turbine. (T.G.O.J.)
1939	S.Z.D.	1'E	Werk Voronesch rebuild C/N ?	SO19 1245	(1524 mm).Condenser.
1941	S.N.C.F.	2'AAA2'	Schneider C/N 4647	232.Q.1	Individual axle drive
1944	Pennsylvania	3'D3'	Baldwin C/N 70900	S2 6200	Westinghouse Turbine (Models: Sunset 'O', Key/Samshonga 'HO')"
				Total 19	

Recruitment With Sex

A Powerful Tool in Attracting New Club Members

Terry Collins bites the ~~apple~~ bullet and takes a stab at the nether regions of model engineering clubs and societies

Now before you get all hot and bothered and raise more steam than your loco about a free night on the town courtesy of the club's new members campaign, take a cold shower. This is that article where we talk about what bees do to flowers, and how, if it is well managed, can result in young members staying active in the club instead of being lost as soon as the hormones start raging.

Human wants

Scientists who study these sort of things agree that there are three basic wants that all humans crave:

- The first is food. Thats fairly elementary.
- The second is shelter, meaning house or home to you or I. If your a student of history, it will not take you long to think of a club that has used these two to recruit back in the past. In actual fact, perhaps in this economic recession, your club might have to spend a little time ensuring that a retrenched member can maintain these two items.
- However, once a person has a full belly, a roof over their head, and is old enough, the urge to procreate pops up as a powerful influence on their life.

Hormonal induced insanity

It is during this "unstable" period when all male organisations like model engineering societies suffer the greatest loss of young members. If the eventual "she who must be obeyed", (to borrow a well known phrase), thinks of model engineering as toy trains or boats or whatever, you can almost certainly scratch off one young member. If you're lucky, you will get him back when he retires.

A new recruiting tack

I would like to introduce the concept of whole of life recruitment. When your club decides that it needs to recruit new members, you have to develop different approaches for different ages. As an organisation, most model engineering associations can recruit the retired with a faint interest and looking for something to do.

A few organisations have developed youth (that is teenager recruitment) campaigns. But haven't these been mostly around a job, which provides food and shelter? What about model engineering societies developing their own recruitment campaign which involves the unmentionable?

Once your teenager starts to think about marriage and raising a family, there enters a second person over whom you have no control. If that person utters the phrase "It's me or the club"!, you know who is almost always going to lose: *the club.*

This is not surprising the way many clubs treat women. However, it is not a hopeless situation as it may seem.

Counter attack!

There are two points of counter attack, or loss prevention, whichever you prefer. Unfortunately, the first is going to be a bit radical for most engineering societies and involves a major reform of the status of women in your club.

1. All your constitutions, rules and regulations, etc need be re-drafted to make women equal, full members. (In the interim, it only takes a sentence in the definitions section of your existing constitution to state that the masculine also implies the feminine).

Of course, such a move will produce more rumblings than any earthquake. Unfortunately, many engineering societies are really a male retreat where the only role for females is serving tea and biscuits. I know of one club where the greatest catastrophe was to have a woman (associate) member rubbed the wrong way and she retaliated by putting up for and gaining full membership.

By all means have a family membership category, which only has one vote, where the spouse is not strongly interested. Don't automatically relegate the female spouse to associate member category. If the interest is there, allow both partners to join as full members, with a vote each. Now, the future lady of steam will see that she is truly welcome. Whenever a member gains a new companion, however temporary, make sure they are made to feel welcome. You might even gain them as a member if the companionship doesn't last. Once a companionship looks like becoming permanent, make a positive move to have them undertake guard and driver training or whatever is appropriate to your modelling.

2. Okay, now you are ready for the second phase; developing the honeypot to attract new young adult members instead of losing them. Now take a quick look at Sesame Street and into the mind of Miss Piggy and her advice to young ladies "CIRCULATE, CIRCULATE, CIRCULATE". When you are young and of the marrying age or intent, finding Mr or Ms Right is important. (It is only later that what constitutes acceptable merchandise broadens with the waistline.)

So there you have it, to get a honey pot, you have to make your club and its activities a place to circulate, then you've got your honey pot to attract more young people, who come to meet other young people.

Yes, I can hear the mutterings. "First you want me to give up my only place of peace from the missus, then you want us to turn the club over to noisy young people. Hell, once the missus finds out about these goings on, I'll be the one not allowed to come back". Perhaps this is a desirable outcome?

How to get them

Unfortunately, it is highly unlikely that your club will be taken over by young people, but you can ensure you keep the new family members and even recruit new members from what is the most difficult age to attract same.

Now, most club running days are definitely not the scene for young singles, so you could have young single days or evenings. Firstly, visit your local council, or tourist information centre and obtain the addresses of all organised youth and young adult groups, then gradually send each of them a general letter advising of your clubs willingness to provide guest speakers and have special days or evenings for select groups. At the worst you waste a stamp, but even if the letter is added to the resources for future activities file by them, then at least they are interested. Many of these young adult groups are looking for invitations such as you send, to show their members hobbies for the future.

Some leads

Some details; there are the service clubs like Rotaract, Young Leos, Jay-Cees and others that generally go to late twenties. In Scouting there are Venturers from 15 to 18 and Rovers from 18 to 25, both can be mixed sex, all male or all female. The guiding organisation has similar groups. Then there are a myriad church based groups, police-citizens and other youth clubs.

Each of these groups is always looking for a good, new and interesting way to spend a day or evening. A once every three months evening run with an entirely different public group can also be a good activity for your members, who are heartily sick of ankle biters.

Other benefits

Apart from the possibilities of new members, the service, scouting and guiding groups might assist with some track or grounds maintenance in return. They'll offer if interested and able.

So, as you can see, once you overcome some historical, inherent sexism in your model engineering association, it is an easy matter to recruit and keep young adult members and new families. They are worth the effort because they usually stay with the hobby for life, and they *are* your future source of new members.

Dead Weight Tester Revisited

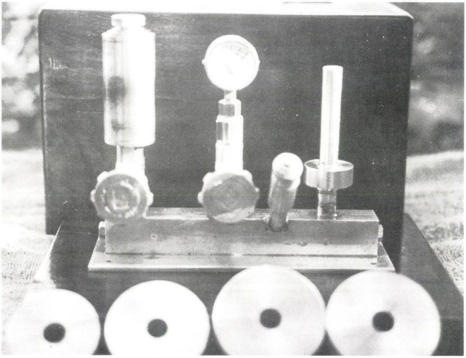
by Neil Matherson

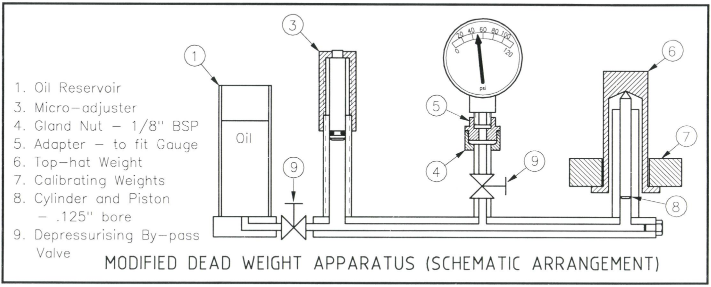
I've been at it again — you print something interesting and I will make it! I have several pressure gauges up to 30 years old, so Jon Milne-Fowler's article on pressure gauge testing was of interest to me (AME March-April 1996, Issue 65, page 35). It took me back many (too many) years as it rekindled memories of dead weight testing as part of my apprentice training.

Modifications

I didn't like the plunger pump as it unnecessary and could be dangerous — one bump and the piston and weights will be ejected and need cleaning, refitting and bleeding of air. I decided to leave out the pump and substitute an extra valve which will hold the pressure gauge bourdon tube extended while winding the micro adjuster out for another change.

I didn't use the pieces of wire as weights either, I just went to some pharmacies until I found one who hadn't thrown away their old balance scales when they changed over to digital scales. I borrowed the scales and the gram weights — much easier.





MODIFIED DEAD WEIGHT APPARATUS (SCHEMATIC ARRANGEMENT)

Holding Work on the Faceplate

by Ted Murrell

In model engineering you come against all kinds of machining situations that need a set-up outside of what is regarded as normal practice. Faceplate work is quite useful when you can't fit your job in a chuck. To make it easy to attach your work to the faceplate you could screw a disc of Oregon, or similar timber 25mm thick and about the diameter of the faceplate, to the faceplate with heavy, but short wood screws. Face off the disc in the lathe.

One job for the faceplate is machining crescent balance weights for locomotive driving wheels. First cut a tin template of the finished weight with two small nail holes for future attaching holes, and to locate the weights on the faceplate. Scribe a line on the faceplate at the outside diameter of weight. Hold the template on the line and drive two small nails in — snip off the nail heads and remove the template. Place template on each of the weights — roughly cut from 3mm plate, or the size for the job — mark the outline, the holes, cut out roughly and drill the mounting holes. Fix each of the weights on the faceplate in turn, holding them in place with two wood screws, large washers, and packing pieces on the inside edge. When the outside diameters are all turned, place the woodscrews on the outer edge, and turn the inside diameter.

To get a narrower weight, position the nails further out on the faceplate, then turn the inside diameter.

Another job for the faceplate is trepanning large rings from brass plate or the like. Mark the centre, and locate the plate on faceplate with the tailstock centre. Run the lathe and true up the plate. Attach the plate to the faceplate with wood screws through a hole in each corner. Cut out the disc from the plate using a parting tool just long enough to go through the plate.

A "Tungsten" Tip to Parting-off

by Stuart Daniels

This operation on the lathe, used to be the most dreaded operation performed. The chip would catch in the cut and jamb, resulting in a broken tool.

Now with the advent of tungsten carbide insert tooling the problems are behind you as long as you use them correctly. The secret is in the shape of the top face of the insert tip, which holds the chip into a curve thus it is thinner than the groove that it is trying to come out off. This can be seen in the diagram illustrated.

Cost vs tool life

The problems with this type of tooling is firstly the cost, they are not cheap to purchase and the replacement tips are about $10.00 each, but the tip life is long if used properly. The other problems can be the rigidity of your machine and the top speed range. Carbide tips like to operate fast and with the machine feeding the tool into the job. For example if you are parting off a piece of steel of 50mm diameter, the revs should be at least 720 revs/min and an in-feed of 0.08mm/rev. This can be more than you are familiar with.

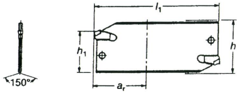
Blade support

The only problem that I encountered was that the tip has to be pushed home hard up to the shoulder of the blade that holds it. The tip has a wedge shape built into itself that locks into the blade to give it the rigidity that it needs. The tips and blades cannot be interchanged with other brands so you must stay with the manufacturer that you first purchased your tool holder from.

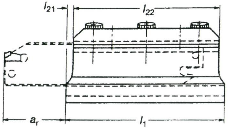
Conclusion

I have no trouble using this type of tooling on a small bench lathe as long as the above is followed, and its a dream to use on parting off brass and bronze but you will get showered with chips.

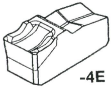
Parting blade

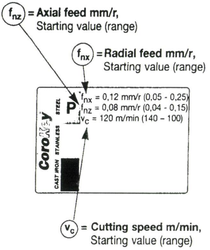


Tool block



Parting/Grooving




P
f_{nx} = 0,12 mm/r (0,05 - 0,25)
f_{nz} = 0,08 mm/r (0,04 - 0,15)
v_c = 120 m/min (140 – 100)
CoroKey
STEEL
CAST IRON STAINLESS

(f_{nz}) = **Axial feed mm/r,** Starting value (range)

(f_{nx}) = **Radial feed mm/r,** Starting value (range)

(v_c) = **Cutting speed m/min,** Starting value (range)

Code definitions

a_p = **Depth of cut** (Total radial infeed for threading) mm
f_n = **Feed** mm per revolution
f_{nx} = **Radial feed** mm per revolution
f_{nz} = **Axial feed** mm per tooth
nap= **Number of infeeds** (threading)
r_ε = **Insert radius** mm
v_c = **Cutting speed** Metre per minute

Bench Grinders — Safety

by Rod Sullivan

Above every bench grinder in a RAAF workshop is a sign prohibiting the grinding of non ferrous metals. My enquiries of workshop personnel revealed that particles of brass, for example, could penetrate the stone and, it was feared, would expand with heat, possibly splitting the grinding wheel with potentially fatal results.

I have never seen such a warning in civilian life, nor did my grinder have any such warning when I bought it.

I doubt an organisation such as the RAAF would have such a warning on every machine without good reason - it is a warning we should all observe.

SAVE THE COAL

KEEP the fire-bed even by breaking the coal, putting large pieces in the fire will cause the fire to become uneven and result in a drop in steam pressure, the fire will require cleaning more often and cause delays to the train and more hard labour than breaking the lumps.

Reprinted from:
Handbook on the Locomotive, Victorian Railways 1951.

C. H. Wear collection

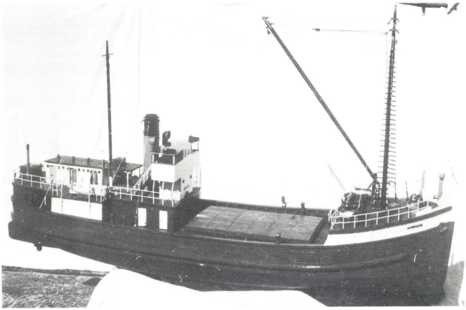
The SS *Nambucca*

by Allan Wright

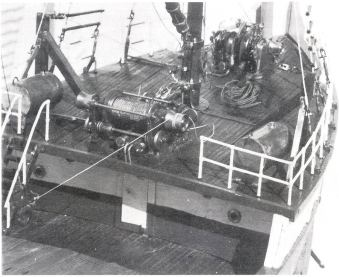
The full-size SS *Nambucca* has a length of 148ft, width of 35ft, and its draft when loaded is 8ft 7inches. The model was made to a scale of 1:20, the length is 7ft 5inches long, by 22ins wide, height at the bow is 19inches. The methods used suited the materials I had on hand, including a 6ft x 3ft x 1/8 inches sheet of copper, most of which has been used in the model, adding to the overall weight.

Hull former

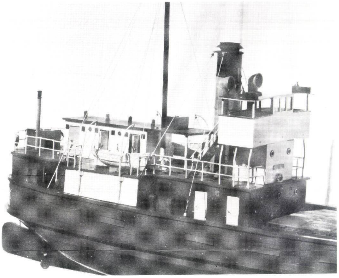
A timber plug to the internal shape of the hull was made first. Coachwood ply 1/2 inch thick was made up in to a channel or U shape section 13 inches wide by 8 inches deep and 7 ft 5 inches long. The ends were filled with solid pieces of Oregon with pieces also on the outside and underneath the ends. Along the bottom, 1 1/8 inch thick cross-pieces were glued and screwed in place. Small pieces of 1/2 inch thick ply were glued and screwed on the other side of the U shaped channel. It was necessary to fill in between these outside pieces at the bottom where the side radii blended into the flat bottom of the hull.



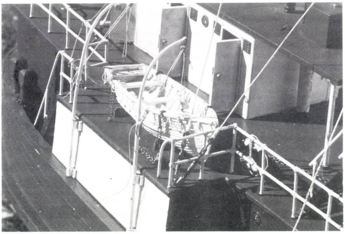
SS ***Nambucca***



A view of the winch machinery.



The SS ***Nambucca****'s wheel house and crew quarters.*



One of the life boats.

The hull

The hull was then shaped and planked over the basic form. Most of the timber used was Blue Gum, Oregon and a little Beech. I had to steam a lot of the planking to enable it to curve enough to follow the lines of the hull. I made use of local timber and cut everything to shape as required. The deck is planked with very narrow decking timbers.

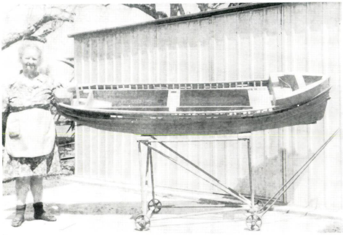
Machinery

The steam winches are non-working but scaled to match the prototype. The engine room machinery and boiler are mounted on a 1/8 inch thick copper plate and displayed outside the vessel when on show. I decided on this method of construction because nothing could be seen if it is installed inside the hull. Almost all the bronze used is what I melted down myself. The ingots were cut into appropriate thicknesses to make the various parts. I don't think I would do it this way a second time!

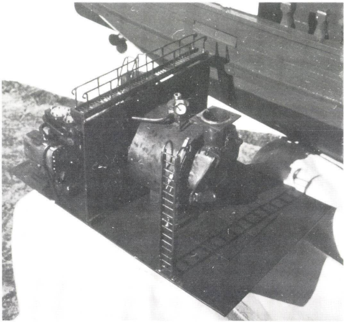
It is difficult to try to describe what has been done, but to build the boat and then try to build the cargo hold in afterwards would have been too difficult.

Conclusion

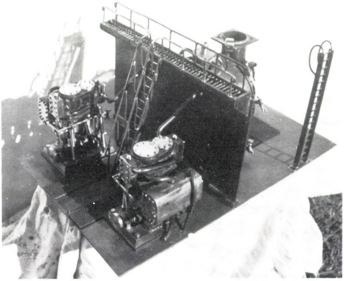
Well over 2000 hours has been spent on the project so far, this model has aroused a lot of interest and will be given to my local Shire Council when finished. The boat is too heavy to float and too difficult to handle therefore the finished model is only a static display. I believe a hull about 3ft long would be the ideal size for a radio controlled model. The lathe (6 inch) and vertical mill I used are home-made machines. I doubted my ability to make things to scale in the way of machining etc., but I am entirely satisfied with the end result.



*SS **Nambucca**'s hull showing the method of construction.*



The boiler room plant.



The engines on the removable plate.

Guidelines For Machining Stainless Steel

by A.W. Easton

Proper selection of the cutting tool may be the deciding factor in the successful machining of stainless steel. Both high-speed steel and tungsten carbide tipped tools may be used.

Use machines that are modern, rigid and overpowered as much as possible. This applies more to the professional production shop than to the average model engineer.

Both the work piece and the tool should be held as rigid as possible. Tool overhang should be minimal and extra support added as required.

All tools should be kept sharp at all times. It is good practice to sharpen them at regular intervals rather than out of necessity. Blunt tools will rub rather than cut and work-hardening will result.

The use of suitable cutting fluids is strongly advised. Sulphurised-chlorinated oils have been found to be the best suited for stainless steel. Water soluble oils may also be employed when machining stainless steel with carbide tools.

Positive cuts should be taken at all times. Dwelling should be avoided, particularly with the austenitic stainless steels. The free-machining grades fall into this group.

The following cutting angles have been found suitable for stainless steel:

• Side rake angle	5° - 20°
• Side clearance	5° - 15°
• Side cutting edge angle	5° - 15°
• Front clearance	5° - 15°
• Back rake angle	5° - 15°
• End relief angle	5° - 15°

Standard twist drills of high speed steel will cut stainless steel. An included angle of 130° - 140° and a clearance angle of 6° - 15° have been found to give the best results.

Where work-hardening when drilling is a problem, chalk on the drill cutting edges or in the hole will help in starting the cut.

The use of suitable coolants when drilling is strongly recommended.

When marking out the austenitic grades for drilling, a square or triangular pointed punch should be used. A conventional prick punch will work-harden the metal and make starting of the drill more difficult.

Standard reamers of high-speed steel are suitable for use on stainless steel. Cutting action is necessary at all times as the reamer life is shortened when there is insufficient stock to be removed. Where the hole size is too close to the reamer size, the reamer will tend to wedge rather than cut thus resulting in reamer wear or breakage.

When tapping stainless steel, the drilling size hole should be no more than 75% of the full depth of thread. An allowance of 100% of the thread depth requires much more power for tapping than an allowance of 75% of the full depth. It should be kept in mind, that a 100% thread depth is approximately 5% stronger than the 75% thread depth and its use is not warranted in most applications.

Managing your Model Locomotive Boiler

Part 2 — Parts of the Boiler, Water Treatment, Operation

by Lindsay Brack

Now, let's go to the top of the boiler, to the parts that we can easily see. Most of us know what sits on top of a locomotive boiler. Starting from the front section is the smokestack or chimney. The stack is used to exhaust the gases that are no longer required from the firebox. This is done by means of the exhaust from the engine's cylinders and the blower. It also helps to keep the cinders and soot from the operator's eyes.

Sand dome

In most cases these not used in miniature railroading. On the prototype steam locomotives, it is an important feature of the locomotive, became its function is to drop sand ahead of the driving wheels to prevent the wheels from slipping.

Steam dome

This is the highest part of the boiler for steam storage. From here steam is taken to the locomotive cylinders. The steam used back in the cab is often taken from this area, for operation of injectors, steam driven air pumps, and steam operated whistles. The blower is also operated by steam. The reason for the steam dome is to keep the steam collection point further removed from the water in the boiler. This tends to give a hotter, drier steam going to the cylinders, and the steam manifold in the cab.

Safety valves

Usually there are two of these on locomotives. They are used to relieve the boiler of excessive pressures. Most of our safety vales in scale railroading are set to 100 psi or 700 kPa maximum. This is sufficient pressure to run most of our engines. If the safety valves do not function, we will have too much pressure in the boiler and this would be very dangerous. They serve strictly as a safety function, and should be checked regularly prior to the running and operation of a steam locomotive.

The impact of water

So far, we have only talked about what the fire does to a boiler. We must also realize what water can do to the interior of a boiler. Many people who are in the Live Steam hobby tend to overlook this important feature of proper boiler operation. Water contains three harmful elements — calcium, phosphates, and magnesium — that create problems when heated and subjected to the pressures on the interior of boilers. If these elements are not removed with water conditioners the following is likely to occur: they would cake up like eggshell material, adhere to the interior of the boiler and coat the flues and the crown sheet. Over the years, this substance builds up, becoming thicker and thicker. After a while, the boiler will not fire properly because heat transfer has been reduced considerably.

I think that the proper use of additives to the loco water, in the tender or side tanks for an engine with a steel boiler is important. It also has the added feature of a rust inhibitor and tends to reduce foaming. What I do recommend is that the owner of the locomotive boiler etc, take a sample of the local water supply to have it analyzed by an industrial chemist. When the water has been analyzed, ask the chemist to advise you on the type of additive required, and the exact amount to be added to your loco water supply.

Copper boilers

How often have we heard it said, "OH! I don't have to worry about that as I have a copper boiler and it won't rust"? We are not concerned with rusting. We are concerned with this calcification of the interior parts of the boiler so that sometime, depending on how much the boiler is used, the boiler will become inoperable.

It is necessary to clean a miniature boiler internally. The compounds that we have been talking about will take the calcium, magnesium and phosphates and blow most of them out through the blowdown valve. But, much of the harmful elements are still left in the boiler, and they cling to the interior of the boiler in a mud-like substance. This muddy substance continues to grow but can be easily removed because it remains soft.

Wash out

About every 300 hours of operation, it is a good idea to remove the safety valves, the blowdown valves, and the plugs on the backhead, and any other washout plugs that overlook the top of the crown sheet. Insert a copper tube long enough to reach the front tube plate, which is attached to a water hose. By opening the water hose valve, we can flush out all of this muddy substance. You will be very surprised to see how much mud comes from the interior of a boiler. This copper tubing is moved back and forth up and down, and across all of the flues in an attempt to clean the area, not only of the boiler itself, but the outside part of the flues. Needless to say, it is important to clean the crown sheet, the sides, and the top also. Keep running cold water into the boiler until the water coming out of the blowdown area runs clean. When this water has cleared up, you know you have cleaned the boiler internally.

Operation

Next we will fire up the engine and have it ready to run on the main line.

What does the operator do when firing a locomotive? How does is the locomotive prepared for running? And, finally, what are all the essential details that have to be taken care of.

Fill the boiler and tender with water, don't forget the feedwater treatment to ensure keeping the interior of the boiler clean.

Lighting up a locomotive fire requires different methods for burning coal, fuel oil, propane or wood. So, at the moment, let's not get into that, but let's talk about what we do once a fire is in the firebox.

Routine oiling

What else has to be done? Lubrication of the bearings is very important for the longevity of a running locomotive. I do feel that too much oil is a lot better than not enough. It is important that you know exactly where all of the bearings are that need lubrication. I recommend that you memorise the location of all these bearings. Don't let every Tom, Dick or Harry oil the bearings. If so, supervise them, but make them your responsibility.

This is a good time to check the steam cylinder oil in the lubricator that services the steam chests and the pistons. Be sure they are filled with proper steam oil. It might be a good idea to put a drop or two of steam cylinder oil on the piston rods and valve rods, and on the valves and piston rods of any feedwater pumps. If you have a steam-driven feedwater pump with a displacement-type lubricator on it — don't forget to fill the lubricator.

How about the sand dome if you have one? Does it need filling? If so, put the sand in, or whatever materials you are using instead of sand.

By the time you have oiled around the loco your boiler pressure should be around 50 or 60 pounds of pressure. If you have used an electric blower, or compressed air to assist the draught — as you would in the case of char, coal, propane or oil, — disconnect it now and let the boiler's steam blower continue the draught. Steam pressure will continue to increase. Now is a good time to crack the valves on the steam driven water pumps if you have them. Because they are still cold you will find they are full of water — the steam will displace the water, and the pumps will begin to operate. Now that the steam pumps are working, check the injectors. Be sure the injectors are operating correctly.

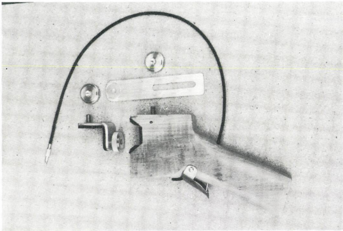
Do they cut off alright with no dribble from the overflow pipe? Is the boiler check valve holding all right? These are all-important matters you must look into before you can take the train out on the main line.

To be continued...

A Camera Trigger Grip

by Dave Harper

I have found a trigger grip makes using the zoom lens for photographing moving model a lot easier. It's a grip that screws under the camera, and has a trigger which connects to your shutter release via a cable. This means you hold the camera in a balanced position with one hand, focus and zoom with the other, and at the right moment, just squeeze the trigger. The commercial units cost $75 - $100, but I made my own which has the added facility for turning the camera to its vertical position if required. Mine cost less than $30 for the cable release and some fancy aluminium screws. The basic materials, a lump of 100mm x 50mm pine, some aluminium strip 25mm x 3mm and a bit of brass sheet for the trigger, were laying around the workshop — the photos should make it all clear. The camera shown in the photos is an old one, couldn't take pictures of my Pentax with itself!

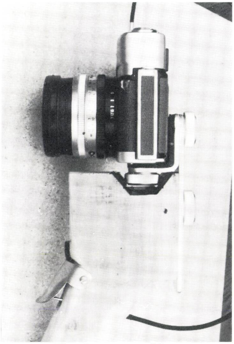


All the bits! The knurled screws/nuts are tripod screws from the camera shop.

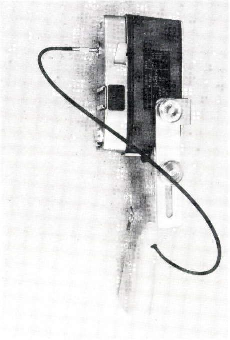
Another thing I do for these zoom shots is to use 400 ISO film. This enables me to use a faster shutter speed with a smaller aperture combination, all of which helps get sharper pictures.

Nowadays film is available up to 3200 ISO, so there's plenty of scope for higher speeds if you feel like experimenting.

A final point to remember is that if you are having enlargements made, it is possible to have the picture cropped to remove unwanted background or whatever. It's best to mark on a small print (or photocopy) how you want the enlargement done, then your processor shouldn't have any problem getting the results you want. It's worth sticking with a shop that will do this sort of thing for you, even if it costs a little more.



The trigger mounted for "landscape" pictures.

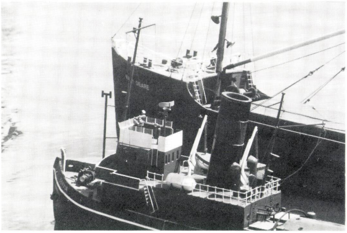


The trigger mounted for "portrait" pictures.

For big enlargements, nothing beats the bigger negatives of the medium format cameras, specially if you want a lot of cropping done! It does mean shopping around for a lab that handles 120 processing and establishing a rapport with them. Of course, if you have access to a darkroom, it's a whole different ball game! One of these years...

I never tire of reading books and magazines on photography. There are plenty in our local library, so it's a cheap enough pastime. The latest mags are good for finding out about the latest gear, gadgets and film, and I've bought most of my equipment second hand through the local *Trading Post* newspaper. Reading doesn't just improve the mind, it can save you heaps!

Got it! Bill Pearce's MTB caught at speed using the trigger grip.



Close-ups are easier too... Jim Curtis' model tugs, ***Cervia*** *in the foreground and* ***Mary Deare*** *behind.*

AMBSC Boiler Code Part 1 Index

Unfortunately, the AMBSC Boiler Codes usually come with a Contents page, but no Index. Peter Dawes has compiled an index for our readers who have the Code and are slowed down while they are searching for something... bmc

Index to the AMBSC Boiler Code, Issue 6, 1994

Compiled by Peter Dawes

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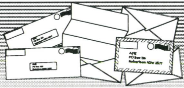
AME...
Reading about it is the next best thing to being there!

Letter Box



Memories of Hales Creek

Sir,

I read with interest the article the Hales Creek Railroad in the Jan/Feb edition of AME and what a flood of memories came back to me when I read that the 4-8-0 Loco mentioned had been known as the Mohawk. It and the other locos were in steam and on show at an exhibition held in the Melbourne Exhibition Building in 1949 or 1950 I now cannot recall which year it was. One of our papers printed a picture of Mohawk with a young lady suitably dressed in engine drivers cap and overalls driving it and it also stated it had taken almost then thousand hours to build.

Three straight lengths or railway line were laid in one of the side areas of the building with a suitable floor covering set out under the tracks and visitors were given rides behind Mohawk driven by a bespectacled man dressed in suitable overalls and an engine drivers cap with the top swept back at a rakish angle and I recall he was ready to chat with visitors even to passengers sitting behind him while he was driving.

This engine was capable of a strong and fast start with an impressive bark, at one point a banner had been stretched across above the tracks and I remember how it flapped about as the engine passed under it.

I can recall the 0-4-0 switching loco mainly because of the slope on the top of the tender, but I cannot remember details of the 4-6-2, loco.

I understand these two locos are to be overhauled and I am sure I express the thoughts of many AME readers when I say I hope we will see some pictures and accounts of overhauls when they are back in service.

J. Tatum

Vic.

Whistle on

Sir,

I am writing this letter to you, hoping that you may help us with a request in AME. We run a C17 from Atherton to Herberton and a D17 from Ravenshoe to Tumoulin on the Atherton Tableland.

The request is if anybody has a NSW chime whistle — or any chime whistle — that they would like to donate to us. It would be great to hear a chime whistle on a C17 running up the Herbutor Range — with ruling grades of 1 in 35!

If you can help us we would love to hear from you.

We feel that the Valleys are lacking the sounds of a chime whistle. If any of you are in the North please feel free to look us up.

Warren Byrnes

Qld.

A Sampson engine

Sir,

On reading through issue 65, March-April 1996, Dave Harper of Steam Chest refers to a model of a vertical Engine made by a Dave Sampson of Brisbane.

If you could contact Mr Sampson he maybe interested to know that one of these engines was installed in a local butchery when the place was built some time during the 1870s and worked the sausage making plant for some 70 or 80 years until replaced by an electric motor. I think from memory about the 1950s and was only sold at auction fairly recently.

I believe my grandfather, an engineer who migrated here from England about 1860 was involved in its installation. As a boy and young man I watched this engine operating on many occasions as I passed the place on my way to and from the local Technical College. We always knew when fresh sausages were being made due to the unusually loud bark of the exhaust which could be heard over half of the town.

As I remember, I think the bore and stroke would be about 5" x 10" give or take a little bit. My only suggestion for a Governor belt for Mr Sampson's model would be and O-ring of which there is a big range of sizes on the market these days. I also drove a pickering governor on a small steam engine with the sound leather belt supplied by the Singer Co. to drive their early treadle sewing machines. Hope this information is some help.

Regards

Alan Lee

Vic.

Life on the narrow gauge

Len Heaton spent a lifetime among the Sugar Cane Tramways. From hitching a ride to school on the footplate of engines from the Sth Johnson Mill to retiring as the Chief Cane Inspector at Marian Mill. In this capacity Len's responsibilities encompassed all that was involved with transporting over two million tonnes of cane to the mill during the 20 week harvest period. With reference to the ***Toneya*** *article in November-December 1996 issue of AME he writes the following:*

Sir,

I have just received the latest issue of the Australian Model Engineering containing your article on *Toneya*, which I enjoyed reading.

The need for the 3'6" gauge buffing gear arose from the requirement of some mills to shunt QR wagons at various times during the day (the mills worked 24 hours). In the case of Kalamia Mill, the owners of Airdmillan, they were about 10 kilometres from the QR tracks. In order to ship their sugar to Townsville, the QR would place the sugar wagons in a siding beside the main line and the mill would then have to haul these wagons to the mill, load and then return them to the QR siding. Why not use a 3'6" gauge loco? Well the total amount of work required may only amount to 6 to 8 hours per day. The loco was engaged in cane haulage for the other 16 to 18 hours.

We had the same situation at the Marian mill. We were right beside the railway, but the QR would only place empties in the loop and take the fulls out. We used the Perry and one of the 18t Clyde locos, similarly equipped, for all our shunting. They loaded both sugar wagons and molasses tankers and prior to 1968 they shunted ordinary wagons of cane which the railway hauled around the mill yard. Outside of these requirements the loco was able to carry out other duties such as yard full and empty shunts and short runs close to the mill. On day shift the Perry would spend about 50% of the time on railway shunts and 50% on tramline shunts. Afternoon shift would be nearly all on railway work, as both the sugar and molasses trains would arrive. Night shift was almost always tramline workings.

In those days there were no auto coupiers, only buffers and screw couplings. The flat plate for the buffers to rest upon allowed the wagons to be pushed around sharp curves without causing a buffer-lock with the loco.

Len Heaton

Qld.

Letterbox Contributions

Contributions of letters by mail to:
PO Box 136, Robertson, NSW, 2577 or
fax to: (02) 9646 1362 are very welcome.

As far as possible, AME is an open forum for all members of our hobby. Therefore, all expressions of fact or opinion — as long as they are not libellous — will be considered for publication.

Please **type or clearly print** your letters, as script is often difficult for the typist to interpret.

The Letterbox is a popular medium of expression, so space is limited. Therefore, letters of 400 words or less will have a better chance of being published.

bmc

News Desk

compiled by Brian Carter

Welcome to another edition of AME. At least this time you should have it close to what is supposed to be the "normal" distribution time.

The "gatherings" are fairly quiet over the Christmas period so it is a good opportunity to catch up with the family, and some modelling work in preparation for the Easter convention. Don't forget to get your convention registration forms in!

The questionnaire

Thanks to the hundreds of people who filled in and sent back the questionnaire in the centre of the January-February issue. You have given us some very valuable feedback. Many thousands of forms were printed so I guess there are are a few more readers still thinking about it — please send it in as soon as you can. We would really like our overseas readers to fill it in as well — please have a go.

New clubs

The Tauranga club in NZ have received a newsletter from EBOP MES which appears to be an operating concern. The initials could be Eastern Bay of Plenty Model Engineering Society and they are in Whakatane. We don't know any more than that but congratulations to the EBOPMES. I hope they have an enriching and fun time in the hobby.

A new group — as yet unnamed — has been formed on the NSW Mid North Coast. It is made up of modellers mainly interested in 5" narrow gauge railways. The models seem to be of mixed prototype, but the description of the railway they've built smacks of the Darjeeling-Himalayan railway in miniature! I am looking forward to seeing this one! There is a note from them in the Club Roundup.

Congratulations to the Warringah Model Engineering Society who have just celebrated their first birthday.

On the international scene, I received a letter from an Italian club — Ferroviaria Associazione Modellisti. They were inviting model engineers to an International Steam Modelling Festival to be held in Foligno - Valtopina (Umbria) last September. Unfortunately, the letter arrived too late to do any good. I thought I'd mention it anyway, because it seems like it might be an annual event. If you happen to be going to Italy in the early part of September you may care to visit the event. This club appears to be the first in Italy to have outdoor tracks, 5"g and Gauge 1. They are making plans for a 7¼"g mountain railway one mile long. You can contact them through the President:

Dr. Guido Mattoli
via Roncalli, 11 I-06034 Foligno (PG)

Trade and commercial

Hare & Forbes Pty Ltd will be holding their 4th annual sale and demonstration day from Thursday 22 May to Sunday 25 May. This sale is of particular interest to model engineers. Besides the many extra special machine and tool prices and the Rotary Club barbeque, there will be many practical demonstrations. The Hornsby Model Engineers will have a large display of members' work. Some of the members will be operating metal lathes and other equipment to manufacture model engineering related projects. It's a great opportunity to ask questions of seasoned model engineers. There will be woodturning and other wood related demonstrations by experienced operators. Another feature of this weekend is the presence of trade technical representatives to help answer those special questions you might have. See their ad on page 4.

Plough Book Sales have added some different books to their range on page 56. Have a good look through and see if you can spot them.

Peter Brotherhood

If you read the story on page 24 of the November-December issue you may be wondering what happened to the sketches referred to in the article. Unfortunately they were accidentally left out in the rush to get the magazine finished. However, recent research by Don Payne has unearthed a goldmine of information about this fascinating company — in fact they still exist in a big way in the UK! They produce a wide range of industrial equipment, including steam turbines.

I will re-run the article in the May-June issue with the sketches and incorporate some of the new information supplied by the current Peter Brotherhood company to bring the story up-to-date. Don has sketches of the Brotherhood rotary three-cylinder steam engine on a variety of applications so it should give you food for thought for adapting your models.

Through correspondence with the UK we have discovered that there is a Brotherhood three-cylinder steam engine still in active service in WA. Our WA rep, Doug Baker, is arranging to get some photos of it in time for the May issue — thanks Doug!

Traction Engine Rally 1997

The preparations are under way and you should be hearing from Bob Neal shortly. As it stands at the moment: the rally will be held at the Walka Waterworks at Maitland NSW over 3, 4, 5, 6 October. It is a long weekend in NSW. Friday 3 October is arrival day with a BBQ at 7pm. Saturday and Sunday are running days with Monday a pack-up day.

If you are not on the traction engine register and would like to attend you can contact Bob on (049) 32 8507 (9am to midday). It should be a great weekend — if you aren't already aware, Bob is also the Chairman of the Maitland Steam Fest Committee.

I visited the Walka Waterworks during January and I was pleased with the venue. I hope to present a few photos of the area in a forthcoming issue.

TAD

If you are able-bodied, here's your chance to do a good deed to help ease the life of someone less able than yourself. I received the following note from the TAD Client Service Coordinator, Winsome Baker.

Dear Sir,

One of our technical volunteers brought to our attention the article about REMAP published in UK *Model Engineer* Vol.176 No.4016.

There is in Australia, a similar organization, called Technical Aid To The Disabled. George Winston, an electrical engineer, was the instigator of TAD over twenty years ago. Now there is a sister organization in Canada, TETRA, which is an exact copy of TAD Australia.

Our volunteers make devices to help people with a disability when they cannot source them commercially. These devices are all made in the volunteers' home workshops; they are all very proud of the finish on them.

Occupational Therapists are our major source of referral as they see many people with what may seem insoluble problems, but with a few heads put together from the resources of the TAD professional staff and the technical volunteer usually a good solution can be arrived at.

TAD operates throughout Australia and in order for us to keep this service readily available to help our many clients we are always looking for engineers, skilled craftsmen, handymen and people interested in electronics.

If you are interested in offering to help TAD please ring (02) 9808 2366 if you are in the Sydney metropolitan area or (02) 9808 2022 for the number of your nearest branch.

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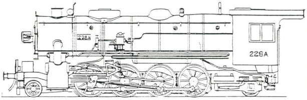

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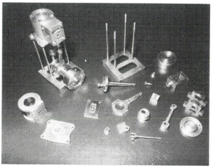

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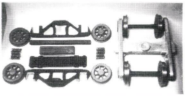

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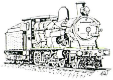

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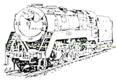

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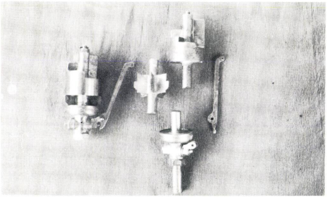

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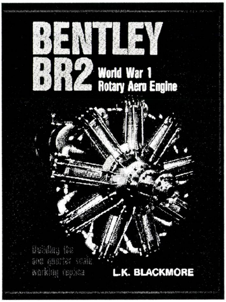

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